International Integration *of the* Brazilian Economy

Edited by ELIAS C. GRIVOYANNIS

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Editor

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This Palgrave Macmillan imprint is published by the registered company Springer Nature America, Inc.
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I respectfully dedicate this volume to my professors:

William J. Baumol
Israel Kirzner
Wassily Leontief
Fritz Machlup
Edmund Phelps, and
Dominick Salvatore

who inspired me during my graduate studies. I am immensely indebted to them.

Preface

No one is better equipped to deliver a more insightful and thoughtful analysis of Brazil's international economic integration than the Brazilian University Professors who authored the chapters of this book and know the country intimately. Their academic training in economics and expertise in scholarly research, along with their grasp and deep personal knowledge of their own country, enable them to bring an authoritative lens to help us understand where Brazil is coming from to meet the opportunities and challenges of the world economy today, and its manifest destiny in our age of globalization and economic integration. To understand Brazil's place in the world economy today you must first read this book.

This fascinating investigation of the international economic integration of the Brazilian economy by renowned Brazilian university professors explains the role of domestic demand in Brazil's foreign trade, the role of competitiveness of Brazilian manufacturing in international and domestic markets, the role of innovation and government policies on Brazil's international competitiveness, the technological intensity of goods exported and imported by the Brazilian economy, the Brazilian-Chinese partnership in economic integration, the impact of Brazil's international trade and balance of payments on its economic growth, the impact of Brazil's external insertion in the world economy and its participation rate in the global value chain, the economic implications of Brazil's integration with Mercosur countries and world economies, and so on.

The authors identify and analyze the economic factors and networks that facilitate Brazil's transition toward a stockholder of a more widely shared international prosperity. The book is rich with detail, firmly grounded in extensive primary source data, sound scholarship, and outstanding work in delving into Brazil's role within the global economy. This book also provides important insights into the sweeping changes that have occurred in 2018 in the principles governing the world economic order and the world economic uncertainties initiated by the trade war of the United States and other countries.

With contributions from leading senior and younger Brazilian scholars, this *book* offers a rigorous and up-to-date analyses of the important aspects that determine Brazil's international trade and its economic integration with the world. It is highly readable and informative and enables comparative analysis of international economic integration in other emerging and advanced countries. It is an essential resource for students, researchers, and all those looking to understand the place of contemporary Brazil in the world economy.

New York, NY, USA Elias C. Grivoyannis
August 17, 2018

Acknowledgments

This is the second volume of a book project on the Brazilian economy from the local perspective. The first volume was published by Palgrave Macmillan in 2017 under the title *The New Brazilian Economy: Dynamic Transitions into the Future*. Work on this book project began in 2013 when I invited Dr. Marcos Reis, a Brazilian Visiting Scholar at the Institute of Latin American Studies (ILAS) of Columbia University, to contribute a chapter. Dr. Reis introduced me to other Brazilian scholars who have authored the chapters of this book, and he invited them to submit their research topic proposals to me. This book project would not have been possible without the collaboration of the 26 authors who contributed the 14 chapters for the first volume and the 25 authors who contributed the 13 chapters of this volume. I am grateful to these colleagues for taking time out from their busy schedules to provide me with the manuscripts of their research. I would also like to thank them for their patience and forbearance while this volume was being prepared for publication.

I also wish to thank my family, my wife Beth, my son Constantine, and my daughter Anastasia, for their support and understanding, which enabled me to take valuable time away from them to work on this book project.

The delicate task of organizing and overseeing the various stages of production of this volume was completed with great care, patience, and efficiency by Allison Neuburger, Assistant Editor, Economics and Finance,

Palgrave Macmillan Springer Nature, and Elizabeth Graber, Commissioning Editor, Economics, Palgrave Macmillan. I would like to thank both of them for their generous support and encouragement, especially during times when I began to wonder if this book project would ever come to fruition. I hope they will accept this book as a token of their help and support, knowing that it could not have been done without them.

Ms. Sujitha Shiney, Springer Nature, SPi, Project Coordinator (Books), took enormous care over the copy-editing of the contributions, which have all benefited from her sympathetic but critical eye.

I remain grateful to all of them.

Yeshiva University
September 5, 2018

Elias C. Grivoyannis

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Introduction: International Integration of the Brazilian Economy from Local Perspectives

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International economic integration is the outcome of an international trade process by which national resources become more and more internationally mobile while national economies become increasingly interdependent through the mutually beneficial voluntary exchange of goods and services undertaken by national and multinational enterprises.

The intensity of mutually beneficial voluntary trade depends on an open and market-based export and investment regime in the countries to which national and multinational enterprises bring their business. Liberal foreign trade government policies along with bilateral and multilateral trade agreements are crucial for the success of multinationals and the creation of national benefits from international trade.

There is more than politics and policies, though, to be understood in the process and in the outcome of international economic integration of a national economy. This is what you will find in abundance in this book. The authors use Brazil as a case study and explain both the process and

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the outcome of its international economic integration by analyzing in each chapter a different contributing factor to the benefits and costs from international economic integration. This makes the reading of this book extremely valuable.

Another important feature that makes this book unique is the fact that its authors are native Brazilian academic scholars. They possess both the professional training and the personal familiarity of the issues they investigate in their chapters. This book is a collection of pioneering and innovative set of studies that brings together a remarkable group of Brazilian scholars to explain how and why the Brazilian economy moves through international trade to take its right place in the world economy. In this book you will find a compelling account of international economic integration elaborated intensively for the Brazilian case with valuable lessons for other emerging and advanced economies around the world.

The process of international economic integration and its outcome, also referred to as globalization, is of great interest to both scholars and students in academia and to practitioners in business and politics. Scholars in economics, finance, marketing, management, politics, sociology, economic history, and journalism are interested in scholarly publications by researchers in academia who address the international economic integration issues of those countries with rigor and credibility, as was also mentioned in the introduction of the first volume of this book project on the Brazilian economy.[1] International policy decision-makers as well as multinational enterprises and financial portfolio-managing companies interested in investing in those emerging markets would also be interested in *scholarly publications* that address the economic development issues of those markets *with rigor and credibility*. This is the need that this book, *International Integration of the Brazilian Economy,* will satisfy.

Most of what is published outside of Brazil on the international integration of the Brazilian economy is authored by non-native outsiders, by non-economists/non-specialists, or by authors with only undergraduate degrees. As a result, those publications are contaminated by the *subjectivity error bias* of their *casual analysis* and by the *ephemeral value* of their journalistic type of standpoint.

This book on the international integration of the Brazilian economy is different from anything that already exists in the market. It is authored by *native economics scholars* and will give the reader the *local perspectives on*

the international integration of the Brazilian economy. The editor of this book, Dr. Grivoyannis, with the assistance of the young Brazilian scholar, Dr. Marcos Reis, selected the authors of each chapter from the established (old) and the emerging (new) scholars and faculty members of the top academic institutions in Brazil. Each chapter is written by a *high-profile economist* focusing on a key area of the Brazilian economy as perceived and understood by a native scholar.

This book also adds *a dimension of historic value* to the literature. Future historians will be able to find in this book how native scholars understood the economic globalization issues of Brazil at the beginning of the twenty-first century and will learn their main concerns. Many of these native scholars (authors of this book) are already influencing the policymakers of Brazil and the managers of Brazilian foreign trade and multinational enterprises directly or indirectly through their teaching and research. Their ex-college students currently manage and regulate the Brazilian economy and will continue to do so in the future.

1.1 Chapter 2

The second chapter of this book analyzes the fundamental relationship between domestic effective demand and foreign trade for the Brazilian economy and establishes a conceptual foundation for understanding Brazil's international economic integration.

The degree of Brazil's international economic integration is determined by Brazil's trade with the rest of the world. Trade includes both, exports and imports. The composition of exports and imports, along with their monetary value, is determined by domestic effective demand.[2] Domestic demand creates and sustains domestic supply.[3] Domestic supply becomes international exports when other countries have an effective demand for the domestic supply and can sustain their demand for it. Domestic demand determines also the composition and the magnitude of imports from other countries. Domestic demand, therefore, determines Brazil's exports and imports and, ultimately, the degree of its international trade and economic integration.

During the Import Substitution Industrialization (ISI) policy of the 1950–1970s, for example, the Brazilian economy grew rapidly as a result

of massive investments and increasing production of durable goods, intermediate goods, and capital goods. The increasing demand for investment goods during this period of ISI had a different impact on the composition of Brazil's international trade and on the structure of its international integration than in subsequent periods. The 1980s were characterized by stagflations and economic policy prescriptions summarized in the "Washington Consensus."[4] By early 1990s, tariff barriers were decreased, financial markets were deregulated, more capital inflows were allowed, public expenditures were controlled, and companies were privatized in Brazil. As a result, Brazil's domestic demand and international trade changed from what they were in previous decades. The Brazilian economy experienced a price stabilization in 1994 and an economic growth acceleration from the mid-2000s to the beginning of the international economic crisis in 2008. The high growth during the 2000s was a result of a strong expansion of domestic effective demand and had a different impact on Brazil's trade and international integration than the domestic demand during earlier periods.

Professors Borghi and Sarti from the University of Campinas (UNICAMP), Brazil, have identified in the second chapter of this book the main driving forces of economic growth and the underlying dynamics between demand, supply, and trade, which determine Brazil's rate of international economic integration.

1.2 Chapter 3

Manufactured commodities are an important component in international trade and an influential determinant in the international economic integration of national economies. The penetration of the international markets by the manufactured commodities of any national economy depends on their market competitiveness. Market competitiveness of any product depends on its quality and on its cost of production, which constrains the downward movement of its price. The higher the quality and the lower the price, the more competitive is the product and the higher is the role this commodity plays in a country's international trade and economic integration.

Professor Castilho and Professor Freitas from the Federal University of Rio de Janeiro (UFRJ), and Professor Torracca from the Federal Rural University of Rio de Janeiro (UFRRJ), Brazil, analyze "The

Competitiveness of Brazilian Manufacturing in both Domestic and International Markets" in Chap. 3 of this book and shed light on the importance of manufacturing in Brazil's international economic integration.

They first examine the international insertion of Brazilian manufacturing given the evolution of international prices and its consequences on the structure of Brazilian and global trade and the development of global trade and production networks. Secondly, they analyze the penetration of foreign goods and the import content of domestic demand in order to understand the evolution of Brazilian manufactured goods competitiveness in its domestic market. In Sect. 3.2 of their chapter, they present a review of the literature on production fragmentation and examine the competitiveness of Brazilian manufacturing from the perspective of productive fragmentation. Holding that perspective allows for a different view of competitiveness that prioritizes the activities, tasks, and all the value created in this process over the transactions of final goods, which is the focus of traditional trade statistics usually treated in conventional literature. For countries like Brazil, the fragmentation of production is important for a number of reasons. There has always been an attempt to access higher value-added chains to improve the external insertion of the country and expand internal sources of better quality employment and sustainable growth income.

In Sect. 3.3 of their chapter, Professor Castilho, Dr. Torracca, and Professor Freitas focus on the competitiveness of Brazil in the international market using indicators of domestic and foreign value added and in Sect. 3.4 they examine the competitiveness of Brazilian manufacturing in the domestic market, relying on the analysis of the import penetration and import content of domestic demand. The last section (concluding remarks) summarizes their findings.

1.3 Chapter 4

Although the Brazilian industry has had relatively poor performance in recent decades, the performance of major economic groups (*Grupos Econômicos*) in Brazil was characteristically different. After a major restructuring during the period of privatization, the major economic groups diversified and internationalized their activities, reduced their financial exposure, and changed their relations with the government, especially in

the case of public concessions and their relationships with state-owned companies. Based on these modifications, Brazilian economic groups were able to grow and diversify, in spite of the low performance of the Brazilian economy during the same period, while they maintained a rapid pace of earnings growth. The restructuring and the post-privatization economic performance of those large business groups had an important impact on Brazil's trade and its international economic integration.

Professor Hiratuka, from the University of Campinas (UNICAMP) and Professor Rocha, from the State University of Campinas (UNICAMP), Brazil, analyzed in Chap. 4 of this book the "Restructuring and Economic Performance of Large Industrial National Brazilian Groups in the Post-Privatization Period." They selected a panel of 20 diversified major economic groups with national capital from the basic inputs sector, the electricity sector, large construction firms, mineral extraction industry, food processing and agribusiness, and the technology-intensive sector, and they analyzed the evolution of the data related to economic performance, with special attention to the ownership restructuring processes, the evolution of financial indicators, and the trajectories of diversification and internationalization practiced by these groups. The work of Professor Hiratuka and Professor Rocha enables us to gain a better understanding of the impact of large national business groups on Brazil's international trade and the economic forces supporting its international economic integration.

1.4 Chapter 5

A modest performance in total factor productivity (TFP) increases the cost of production in any national economy and deteriorates the international competitiveness of its exports. This has a detrimental impact on its international trade and on the rate of its international economic integration. There is empirical evidence that, in recent years, Brazil's export basket has suffered from productivity stagnation and technological regression.

Newton K. Hamatsu, Ph.D. candidate in Economics at the Federal University of Rio de Janeiro (UFRJ), Brazil, and prior Head of the Fundraising Advisory of the Ministry of Science, Technology and Innovation (MCTI), Brazil, in co-authorship with Caio T. Mazzi, Ph.D. candidate at University

of Maastricht (UNU-MERIT), The Netherlands, and prior Head of the Energy Department at the Brazilian Innovation Agency (Finep), Brazil, investigate in Chap. 5 how diminished innovation has contributed to this phenomenon of productivity stagnation and technological regression in Brazil's export basket.

By comparison to the Organization for Economic Cooperation and Development (OECD) and other more dynamically developing countries, for example, Brazil has had inferior performance indicators in innovation inputs and outputs, such as business expenditures in research and development (R&D), patents, and introduction of new products on the market.

To improve the situation, important government initiatives have been put in place in Brazil in order to support the innovation activities of private firms. In Chap. 5, the authors explain those government initiatives and elaborate on the support instruments available to private companies. They also discuss the prevailing institutional weaknesses which render this effort insufficient and threaten its success. Learning about Brazil's government and business initiatives for supporting innovation and enhancing international competitiveness improves our understanding of Brazil's sustainable economic growth, international trade, and international economic integration.

1.5 Chapter 6

Advanced countries are expected to develop higher levels of international economic integration because they possess advanced technologies and can export a wide range of new and improved products and services that feature higher returns and lower production costs, relative to those of their competitors. However, laggard countries that remain trapped in relatively more obsolete production patterns become less competitive in terms of their technologies, and their exports will consequently lose more and more ground in the world market. A gap in design and technology between advanced and laggard countries makes the products of the latter less marketable, or even unsaleable, in foreign markets. Moreover, a gap in technological processes makes their products less competitive in terms of cost and hinders the country's international economic integration.

The rate of economic growth and the magnitude of exports of a country are inextricably linked to the pace of its internal innovation activities (i.e., technological capability), which in turn may benefit from flows of technology and knowledge from abroad through its imports. To contribute to analyses of the possible relevance of imports and exports in technology and for fostering the learning-transfer process, the authors of Chap. 6 explored empirical data regarding Brazil's international trade.

Dr. Tulio Chiarini, a Science and Technology Analyst at the National Institute of Technology (INT), Brazil, and Ana Lucia Gonçalves da Silva, professor and researcher at the University of Campinas (UNICAMP), Brazil, undertook, in Chap. 6, an empirical analysis of the Brazilian case during the 1996–2010 period, by focusing on the flow of international trade goods in terms of the technological intensity of the goods of various industrial sectors—that is, high-tech, medium high-tech, medium low-tech, and low-tech industries. By exploiting relevant data, they indirectly qualified the international transfer of technology and ascertained not only the suitability of technological industries but also Brazil's level of technological dependence.

There is an interdependence between technical-change processes and economic performance as well as between production and trade. For this reason, the sale of technology underscores the performance of an exporting country in world trade, its accumulated technological knowledge, and its ability to create new products that will be absorbed by foreign markets.

The authors of Chap. 6 also present a brief history of Brazil's industrial development process, with the aim of helping the reader understand Brazil's foreign trade flows in the 1996–2010 period and the structure of Brazil's international economic integration.

1.6 Chapter 7

Brazil's international trade and its economic integration with the world economy is influenced by the country's overall economic performance. It would be helpful to understand and consider the economic performance of Brazil during the last two to three decades, not in isolation, but as part of the economic performance of the Latin American countries in the regional economic environment in which Brazil was trying to flourish. During the

"golden years" of economic prosperity we would expect the regional economies to be more active in their trade interactions with the rest of the world and during periods of regional economic slowdown to reduce their international trade and economic integration with other countries.

The authors of Chap. 7 clarify for us the literature debate of whether or not the regional economies of Latin America experienced indeed a whole decade of economic prosperity during the 2003–2013 time period and offer a credible assessment of the issue.

Chapter 7 was co-authored by José Antonio Ocampo, Eduardo F. Bastian, and Marcos Reis. José Antonio Ocampo is a professor at Columbia University's School of International and Public Affairs in New York City. He was United Nations under-secretary-general for Economic and Social Affairs (2003–2007) and executive secretary of the Economic Commission for Latin America and the Caribbean (ECLAC) (1998–2003). He was minister of Finance and Public Credit of Colombia and chairman of the Board of Banco del República (Central Bank of Colombia) (1996–1997); director of the National Planning Department (minister of Planning) (1994–1996); minister of Agriculture and Rural Development of Colombia (1993–1994); and executive director of FEDESARROLLO, Colombia's main think-tank on economic issues. Eduardo F. Bastian is a tenured associate professor at the Institute of Economics, Federal University of Rio de Janeiro (IE-UFRJ), Brazil, and Marcos Reis is a post-doctoral researcher at Institute of Economics, Federal University of Rio de Janeiro (IE-UFRJ), Brazil.

The authors used as representative indicators of a country's economic performance the growth rate of the country's Gross Domestic Product (GDP), inflation, unemployment, poverty rate, and external debt as a percent of GDP and exports. They briefly summarized the literature that presented and discussed the idea of the 2010s as a Latin America decade and/or the first decade of the 2000s as a golden period for Latin America and then compared the period 2003–2013 and the sub-periods 2003–2007 and 2008–2013 (before and after the North Atlantic financial crisis that started in mid-2007 with the sub-prime crisis in the US and became severe after the collapse of Lehman Brothers in September 2008) with Latin America's own performance throughout the 1980s and the 1990s. They assessed the economic performance of 29 countries in Emerging and Developing Asia (EDA), 20 countries in Middle East and

North Africa (MENA), 45 countries in Sub-Saharan Africa (SSA), and 12 countries in the Commonwealth of Independent States (CIS) and compared those assessments to the economic performance of 32 countries in Latin America and the Caribbean during the period 2003–2013.

Chapter 7 enables us to get a better understanding of the topics discussed in other chapters of this book by taking into consideration the economic performance of Brazil's surrounding 31 regional economies in Latin America and the Caribbean, during the 2003–2013 period, along with the economic performance, during that period, of the 29 economies of the EDA, the 20 economies of the MENA, the 45 economies of the SSA, and the 12 economies of the CIS scholarly analyzed and authoritatively discussed by the authors.

1.7 Chapter 8

Table 1.1 indicates that China is the most internationally integrated economy among the BRIC countries (ranked number 1) and Brazil is the least integrated one (ranked number 4) in terms of the number of traded products and the value of trade with the world economy. In 2016, Brazil traded 507 products in the world economy less than China, and Brazil's value of trade was 3.3 trillion US dollars less (more precisely $3,362,771,000,000 = $3,685,558,000,000 − $322,787,000,000) than the value of China's trade.

Table 1.1 International economic integration by number of traded products and value of 2016 trade rankings of Brazil with BRIC countries

Country	Number of traded products	Ranking by traded products	Value of trade (million USD)	Ranking by value of trade
China	**8,873**	**1**	**3,685,558**	**1**
India	8,721	3	617,032	2
Russia	8,771	2	467,748	3
Brazil	**8,366**	**4**	**322,787**	**4**
[China–Brazil]	**507**		**3,362,771**	

Source: World Integrated Trade Solution (WITS), World Bank (6/19/2018) https://wits.worldbank.org/CountryProfile/en/Country/BRA/Year/2016/Summary

Table 1.2 Gross Domestic Product (GDP) in 2017—current US dollars' world rankings by country

Ranking	Country	GDP (2017) (millions of USD)
1	United States	19,390,604.00
2	**China**	**12,237,700.48**
3	Japan	4,872,136.95
4	Germany	3,2677,439.13
5	United Kingdom	2,622,433.96
6	India	2,597,491.16
7	France	2,582,501.31
8	**Brazil**	**2,055,505.50**
9	Italy	1,934,797.94
10	Canada	1,653,042.80

Source: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD

Table 1.3 GDP growth ranking in BRIC countries 2000–2016

Ranking	Country	GDP growth 2000–2016 (percentage)
1	**China**	**9.0**
2	India	6.6
3	Russia	3.8
4	**Brazil**	**2.3**

Source: GDP growth rates calculated by the authors of Chap. 8 using data from the International Monetary Fund (IMF) (2018)

Per Table 1.2, China is ranked as country number 2, after the US, among the world economies, in terms of its GDP, and Brazil is ranked as country number 8. Brazil produced 10.18 trillion US dollars' worth of GDP less than China in 2017 (more precisely $10,182,194,980,000 = $12,237,700,480,000 – $2,055,505,500,00).

Table 1.3 reveals that, between 2000 and 2016, China is ranked as the top country among the BRIC economies in terms of its annual average GDP growth rate, and Brazil is ranked as the lowest one. Brazil's annual average GDP growth rate during the 16 years between 2000 and 2016 was 2.3 percent and China's annual average GDP growth rate was 9.0 percent. China has been growing at an average annual rate of 6.7 percentage points faster than Brazil during this period of 16 years.

The disparities between the economic performance of Brazil and China in terms of their integration with the world economy in 2016, the value of their GDP produced in 2017, and the annual average economic growth during the 16 years from 2000 to 2016 raise the question as to why China has grown so rapidly and Brazil has not. Why is China's economic performance so good and Brazil's is not? Chapter 8 in this book addresses this issue.

Chapter 8 is authored by Fernando Ferrari-Filho and Anthony Spanakos. Fernando Ferrari-Filho just retired as a Professor of Economics at the Federal University of Rio Grande do Sul (UFRGS) and researcher at the National Council for Scientific and Technological Development (CNPq), Brazil. Anthony Spanakos is Professor and Chair of Political Science and Law at Montclair State University of New Jersey, USA (since 2006) and Adjunct Professor of Politics at New York University (since 2007), US.

The authors establish a basis for comparison between China and Brazil by identifying the differences and similarities among the BRIC countries and present a comparative analysis of Brazilian and Chinese economies by focusing on macroeconomic policy, especially the monetary and exchange rate regimes and their effect on economic growth for each country.

Their findings support the argument in the literature that a broad liberal reform agenda, like the one adopted by Brazil, did not necessarily produce stable and robust economic growth. To the contrary, policies that allow governments to maintain autonomy of macroeconomic policies, like the ones adopted by China, seem to have more of an effect in limiting external vulnerability and in producing economic growth.

1.8 Chapter 9

Useful lessons for the world economy from Brazil and China are also discussed in Chap. 9. Chapter 9 looks at Brazil and China from another angle. It analyzes the economic integration between those two emerging BRIC economies in terms of their trade interdependence. Table 1.4 shows that China was the top buyer of Brazilian exports in 2017 (47.5 billion US dollars' worth, representing 21.8 percent of all Brazilian exports). Table 1.4 also indicates that China was the top import partner for Brazil in 2017 (with 27.0 billion US dollars' worth of imports, representing 18.1 percent of all Brazilian imports).

Table 1.4 Brazil's top 5 export and import partners in 2017

Rank	Export partner	Value (billion USD)	Partner share (%)	Rank	Import partner	Value (billion USD)	Partner share (%)
1	China	47.5	21.8	1	China	27.0	18.1
2	USA	27.0	12.4	2	USA	25.0	16.6
3	Argentina	17.6	8.1	3	Argentina	9.4	6.3
4	Netherlands	9.3	4.2	4	Germany	9.2	6.1
5	Japan	5.3	2.3	5	South Korea	5.0	3.5

Source: World Integrated Trade Solution (WITS), World Bank (8/12/2018)
https://wits.worldbank.org/CountrySnapshot/en/BRA
http://www.worldstopexports.com/brazils-top-import-partners/
https://www.exportgenius.in/blog/brazil-main-trading-partners-2017

Chapter 9 was authored by Santiago Bustelo and Marcos Reis. Santiago Bustelo is a Ph.D. Candidate in International Politics at Fudan University (Shanghai, China). He was a researcher at the National Institute of Science and Technology (INCT/PPED—Brazil) in the areas of state, varieties of capitalism, and development in emerging countries, and has served as Parliamentary Advisor to the National Chamber of Deputies of the Argentine Republic. He also worked as Research Coordinator at the China-Brazil Business Council. Marcos Reis is a post-doctoral researcher at the Institute of Economics, Federal University of Rio de Janeiro (IE-UFRJ), Brazil. Before that, he was an Associate Professor of Economics at the National Institute of Higher Studies (IAEN), Ecuador. He previously worked at the Inter-American Development Bank (IDB) in Washington D.C. and was a researcher at the United Nations ECLAC in Santiago, Chile.

The current Chinese growth model has created a strong complementarity between the two economies, with Brazil providing natural resources to China and importing manufactured goods, although those goods present an important challenge to Brazil's manufacturing sector.

The authors discuss the evolution of trade between Brazil and China, the Chinese investments and loans to Brazil, and the challenges of the "New Chinese Economy" after the recent slowdown as a result of a reduction in the demand for Chinese exports from key markets such as the US and the European Union. They also discuss China's rebalancing by shifting from an investment-led growth model, with emphasis on export

competitiveness, to a model where domestic demand plays a more significant role. They talk about the common challenge that faces most of the developing countries after they achieve a certain development stage, that is, the "middle-income trap," and conclude that all these changes will likely pose a significant impact on the Chinese economic relationship with Brazil. The rebalancing of the Chinese economy, raising domestic consumption as the main engine of growth, is expected to open new opportunities for Brazil's exports and investments. It is expected that the emergence of a new Chinese middle class will bring gains for Brazilian agribusiness exports, and the efforts by the Chinese government in restructuring and modernizing the national health system—following the demographic transition and aging population—must give rise to new business prospects with China. Increased demand in China for machinery, medical equipment, and dental devices inaugurates a potential market for Brazilian companies in China.

1.9 Chapter 10

A country like Brazil whose international trade consists mainly of exports of primary and agricultural products, with value-added and market prices relatively low, and its imports which consist of manufactured and industrial commodities, with value-added and market prices relatively high, could face balance of payments (BOP) deficits. The value of international currency received from its low-price exports could end up being less than the value of international currency to pay for its high-price imports and the country might need to borrow international currency to pay for its trade deficit. BOP problems of this type could slow down a country's rate of economic growth, international trade, and economic integration with the world economy.

As McCombie and Thirlwall (1994, p. 233)[5] point out,

> [I]f a country gets into balance-of-payments difficulties as it expands demand before the short-term capacity growth rate is reached, then demand must be curtailed; supply is never fully utilized; investment is discouraged; technological progress becomes less desirable so worsening the balance of payments still further, and so on. A vicious circle is started.

A BOP equilibrium growth rate has been mathematically derived by Thirlwall (1979)[6] and is known as Thirlwall's Law. It states that a BOP equilibrium growth rate for a country is determined by the rate of growth of the foreign demand and by the income elasticities of demand for exports and imports ratio.

Chapter 10 tested Thirlwall's Law for the Brazilian case in order to analyze how well exports dynamics account for Brazil's economic growth during the period 1980–2011. Chapter 10 is authored by Rafael Saulo Marques Ribeiro, Professor of Economics in the Faculty of Economics, Center for Development and Regional Planning at the Federal University of Minas Gerais (UFMG), Brazil. He is also an associate member of the Cambridge Centre for Economic and Public Policy (CCEPP) and the coordinator of the Institute for New Economic Thinking (INET)/the Young Scholars Initiative (YSI) Keynesian Economics Working Group. He was previously a research fellow in the Department of Economics at the University of São Paulo (USP), Brazil.

Professor Ribeiro's main conclusion in Chap. 10 is that, in spite of the commodities boom that propelled the Brazilian exports during the decade of the 2000s, the slow growth of the labor productivity due to the lack of technological innovations and structural changes imposed severe supply constraints that prevented the Brazilian economy to grow faster.

A country's output growth rate depends positively on its existing non-price competition factors, which reflect disparities between countries with respect to factors determining the demand for a country's exports and imports, such as technological capabilities, product quality, stock of knowledge, and consumer preferences, for instance. Therefore, one should consider not only exports of goods and services but also—and very importantly—the income elasticity of imports. Export performance and income elasticity of imports imply that trade and capital account liberalization do not necessarily lead to economic growth through technological gains or through an increase in TFP. Furthermore, export-led growth does not necessarily lead to better economic performance.

Chapter 10 also tackles methodological issues on applied econometrics. In order to test Thirlwall's Law, econometricians have widely used Johansen's cointegration procedures at the expense of Engle-Granger's methods, regardless of the sample size. The last 30-year Brazilian time

series shows that this choice between cointegration tests is not that straightforward, and, even though the Johansen test is statistically more efficient for small samples (around 100 observations), we might be better off with the Engle-Granger method as it provides a faster convergence of the two parameters.

1.10 Chapter 11

About 60 percent of total global trade consists of intermediate goods and services that are incorporated at various stages of the production process for final consumption. These production processes have led to the emergence of borderless production systems, which are formed by sequential chains or complex networks, referred to as Global Value Chains (GVCs). GVCs highlight the ways in which new patterns of international trade, production, and employment shape prospects for development and competitiveness (Gereffi 2014).[7]

In previous decades, especially during the 1960s and 1970s, developing countries had only one strategy for their industrial policy: the ISI.

The ISI model started to lose momentum in the 1980s, and it was practically abandoned by all countries in the 1990s. GVCs appear as the "new solution" for development. Emerging countries should abandon protectionism and, instead of controlling all phases of production, they should specialize in some of them and become integrated into international supply chains.

In this new paradigm, policies formerly used to foster industrialization, such as national content, currency devaluation, and tariffs on imports, become meaningless. Companies should aim for increasing productivity and seeking insertion into GVCs.

Brazil has a very low participation in the GVCs. Chapter 11 discusses the external insertion of the Brazilian economy to understand the determinants of its currently small involvement in that system.

Chapter 11 is authored by Marcos Reis and Daniel Sampaio. Marcos Reis is a post-doctoral researcher at the Institute of Economics, Federal University of Rio de Janeiro (IE-UFRJ), Brazil. Before that, he was an Associate Professor of Economics at IAEN, Ecuador. Previously Dr. Reis

worked at the IDB in Washington D.C. and was a researcher at the United Nations ECLAC in Santiago, Chile. Daniel Sampaio is Professor of Economics at the Federal University of Espírito Santo (UFES), Brazil, and a researcher at Grupo de Conjuntura.

In Chap. 11, the authors discuss the external insertion of the Brazilian economy in historical perspective, examine the participation of Brazil—compared to other emerging and developed economies—in the GVCs, and analyze what prevents Brazil from participating more actively in the GVCs. By falling behind during the time when the first GVCs were formed, Brazil now faces more difficulties in participating in the global markets.

1.11 Chapter 12

Brazil's trade policy and the outcome of its economic integration with the world economy could be considered as an implicit choice between regional trade arrangements and a more non-preferential policy that would not discriminate by national origin or destination. Although Brazilian trade flows do not reflect a particularly strong orientation to other Latin American countries, with the exception of Argentina, Brazil's trade with the other Latin American countries has been a relatively important sector of Brazilian foreign trade.

Even though Brazilian trade during the last 30 years was directed overwhelmingly to the US, the European Union, and China, Brazil's trade with the Latin American countries had a special importance for the Brazilian economy. China, the US, and the European Union were importing from Brazil predominantly primary and semi-processed commodities, while the Latin American countries were importing manufactured goods. Latin American countries have been providing Brazil with economies of scale which were necessary to make its manufacturing industries competitive and viable from the ISI period of the 1950s and early 1960s up to now.

Brazilian attempts to expand formal regional trade agreements beyond bilateral preferential trading arrangements date back to 1958 when the Brazilian government joined Argentina, Chile, and Uruguay in the Treaty

of Montevideo, signed in February 1960. Under the treaty, the members agreed to negotiate mutual tariff reductions on a permanent basis. The organization created by the treaty, the Latin American Free Trade Association (LAFTA—also known as Asociación Latinoamericana de Libre Comercio—ALALC), was only a limited success. LAFTA was replaced by the Latin American Integration Association (LAIA—also known as Associação Latino-Americana de Integração—ALADI), which had more modest goals.

Brazil's most important regional trade initiative is the Common Market of the South (Mercado Comum do Sul—*Mercosul*), established by the Treaty of Asunción in 1991 and Protocol of Ouro Preto in 1994. By the mid-1990s, trade with the other Mercosur partners, particularly Argentina, was one of the most rapidly growing sectors of Brazilian foreign trade. Brazil had a large trade surplus with the region, exceeding 800 million USD in most years. This surplus helped finance Brazil's oil imports from two of the region's oil exporters, Mexico and Venezuela, before the discovery of Brazil's off-shore oil reserves.

Chapter 12 discusses the impact of Mercosur's trade on the Brazilian economy and Brazil's economic integration with the Mercosur member countries. Chapter 12 is authored by Carlos Schönerwald, Júlia Brigoni Maciel, and Luiz Marcelo Michelon Zardo. Carlos Schönerwald is a Professor of economics at the Federal University of Rio Grande do Sul (UFRGS) and a researcher at Núcleo de Estudos sobre os BRICS (NEBRICS), while Júlia Brigoni Maciel and Luiz Marcelo Michelon Zardo are International Relations undergraduate students at the Federal University of Rio Grande do Sul (UFRGS) and researchers at NEBRICS.

The authors analyze Mercosur's economic performance through a Brazilian perspective. They discuss the causes of the bloc's quantitatively bad results and how the customs union affects Brazil's trade policies and international economic integration. They focus on the group's qualitative success and they discuss the evolution of trade flows in view of their complexity levels and the prospects for the bloc in the face of the analysis made.

1.12 Chapter 13

International economic integration is understood as being the outcome of a process by which national resources become more and more internationally mobile while national economies become increasingly interdependent. We can look at international economic integration as the presence of specific prevailing conditions (like low tariffs and trade liberalization policies) that facilitates the economic relationships between people and business enterprises of different countries or as the outcome of a process of economic relationships between people and business enterprises of different countries (like the outcome of quantifiable magnitudes of exports and imports of different countries.)

Although trade liberalization (say, tariff reduction from 20 percent to 2 percent) and economic integration (trade openness resulting in 100 percent increase in exports and imports in ten years) are assumed to be strongly associated with each other, there is no robust empirical evidence in the literature to support this assumption. Subasat (2008),[8] by investigating the link between trade openness and trade restrictions, argues that while a negative link between various types of trade restrictions and trade openness is evident, the relationship is weak, statistically not always significant, and there is no clear evidence that the removal of trade restrictions, via trade liberalization policies, invariably leads to improved trade openness and economic integration.

Researchers have developed numerous indicators of openness and economic integration, which have yielded substantially differing results in past research (Quinn et al. (2011)).[9]

The magnitude of international economic integration can be assessed by the number of trading partner countries, by the number of trading commodities, or by the monetary value of trade. Chapter 13 uses these metrics to report Brazil's international integration with the world economy and compares Brazil's integration with that of the BRIC emerging economies and the G7 advanced countries.

Chapter 13 is authored by Elias C. Grivoyannis, presently Professor of International Economics, Public Finance, and Game Theory at the Economics Department of Yeshiva University, New York City. He also

taught Econometrics and other economics courses at New York University, the City University of New York, and Barnard College. He is the editor of this volume and he is one of the contributors of a chapter in the book, along with Professors José Antonio Ocampo and Anthony Spanakos who are not Brazilian natives.

Countries with a similar outward-oriented international economic integration do not register similar economic growth because a similar level of trade openness can hide different types of trade structures. Countries exporting higher-quality products and new varieties grow more rapidly, while openness to trade may impact growth negatively for countries specializing in low-quality products.

Chapter 13 introduces descriptive statistics to present the standing of Brazil in terms of its international economic integration and compare it to that of emerging and advanced economies. The views of *unrestricted trade with liberal exploitable economic dependencies* and *restricted trade in an economic interdependence with reciprocity and justice* are introduced and discussed, and implications for Brazil and the global economy from Brazil's international integration are derived.

The intensity of mutually beneficial voluntary exchange of goods and services, carried out by national and multinational enterprises, depends on an open and market-based export and investment regime in the countries they bring their business to, which is why the established world economic order has been structured around the ideas of what is known as the "Washington Consensus". Many of its core premises, such as the "abolition of barriers impeding the entry of Foreign Direct Investment (FDI)," "privatization of state enterprises," and "abolition of regulations that impede the entry of new firms or restrict competition," are considered to be crucial for the beneficial international economic integration of national economies and the success of multinationals (Diniz 2006; Williamson 2004, p. 196). However, this institutional setup does not always cater to the institutional context of firms in large emerging economies (Nölke et al., p. 561).

Brazil's eighth largest economy in the world in 2017 has been challenging the liberal world economic order since 2003 with important implications for its international economic integration. Recently (spring of 2018), even the largest world economy of the US has been challenging

the liberal world economic order by imposing very high tariffs to restrict US imports of steel and aluminum from Europe, Canada, Mexico, and China in order to protect the US economy. The US was the main architect and the leading champion of the liberal world economic order up to now. Other emerging and advanced economies are also revisiting the principles on which the process of their international trade and integration with the world economy has been based. These developments on international trade politics and ideas have important economic policy and outcome implications for Brazil and other emerging and advanced economies. It seems likely that the much closer business-state relationship in large markets like the US, China, Brazil, India, the European Union, Mexico, and Canada will lead to a less liberal and more "mercantilist" global order.

Although trade liberalization and trade openness are assumed to be strongly associated with each other and are often used interchangeably, the empirical evidence has not been forthcoming. Subasat (2008), by investigating the link between trade openness and trade restrictions, argues that while a negative link between various types of trade restrictions and trade openness is evident, the relationship is weak, statistically not always significant, and there is no clear evidence that the removal of trade restrictions (trade liberalization) invariably leads to improved trade openness.

Singularly comprehensive, authoritative, and up to date, this book offers fascinating scholarly engagement with a broad array of topics vital to understanding contemporary Brazilian dependency on other countries to sell its exports and buy its imports. With chapters from leading native scholars, associated with top Brazilian universities and research centers, *International economic integration of the Brazilian economy* is an impressive collection of scholarly research, valuable to academic and economic policy researchers, economic consultants, international business professionals, and those interested in the BRIC emerging economies and their place in the world.

Notes

1. See Elias C. Grivoyannis, editor, (2017), *The New Brazilian Economy: Dynamic Transitions into the Future*, Palgrave Macmillan, New York.
2. Demand for a commodity is derived from the willingness of potential customers to buy that commodity for its ability to satisfy a "need," an uncomfortable feeling because something is missing. For a demand to become "effective," a customer's willingness to buy should be associated with his ability to pay the market price (the cost of production and a reasonable return to the investment of the supplier.)
3. If there are potential customers, excited and eager to buy a product at prices which are profitable for the supplier, someone will be willing and enthusiastic to produce that product for them. As a result, an effective market demand for a product generates the required incentives to create the needed supply for that product. This dynamic relationship between demand and supply constitutes "Say's Law" in macroeconomic theory. A market demand becomes "effective" when a customer's willingness to buy a product is associated with an ability to pay the market price for it.
4. See John Williamson, A Short History of the Washington Consensus, 15 Law & Business Review of the Americas, 7 (2009). Available at: http://scholar.smu.edu/lbra/vol15/iss1/3
5. See McCombie, J. and Thirlwall, A. 1994. *Economic Growth and the Balance of Payments constraint.* London, St. Martins.
6. See Thirlwall, A. 1979. "The balance of payments constraint as an explanation of international growth rates differences." *Banca Nazionale del Lavoro*, Quarterly Review, 128, p. 45–53.
7. See Gereffi, Gary. 2014. "A Global Value Chain Perspective on Industrial Policy in Emerging Markets." *Duke Journal of Comparative & International Law* 24: 433–58.
8. See Subasat Turan (2008), "Do liberal trade policies promote trade openness?" *International Review of Applied Economics*, Volume 22, Issue 1, Pages 45–61, https://www.tandfonline.com/doi/abs/10.1080/02692170701745887
9. See Quinn Dennis P.; Martin Schindler; A. Maria Toyoda (2011), "Assessing Measures of Financial Openness and Integration," IMF Economic Review, Volume 59, Issue3, pp. 488–522 https://link.springer.com/article/10.1057/imfer.2011.18

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2

Domestic Demand and Foreign Trade: The Brazilian Growth Trajectory

Roberto Alexandre Zanchetta Borghi
and Fernando Sarti

2.1 Introduction

Brazil has been regarded as one of the most promising countries in the world in terms of economic growth, particularly during the 2000s, when the country has experienced a strong expansion of its domestic market and a relevant growth trajectory.[1] The Brazilian economy, however, has been facing structural challenges of sustaining high growth rates.[2]

From the 1950s to the 1970s, the Brazilian economy grew very fast as a result of its industrialization process. Massive investments and increasing production of durable goods, intermediate goods, and capital goods led to the consolidation of a strong and diversified domestic industry. This period is well known in the literature as the Import Substitution Industrialization (ISI) phase, when domestic industry flourished under state subsidies and protected market despite high participation of foreign capital (Fishlow 1972; Tavares 1972).

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In many countries, Brazil included, facing "stagflation" in the 1980s, which is a mix of economic stagnation and hyperinflation, the former state-led developmental orientation was replaced by a market-oriented agenda for development. Main economic policy prescriptions were summarized in the so-called "Washington Consensus".[3]

This chapter aims to assess critically the Brazilian growth trajectory, notably after price stabilization, pointing to the dynamism of both demand and supply. The analysis highlights the responses of domestic production to demand stimuli, considering foreign trade movements over the 1990s and 2000s. National accounts and input-output data allow for the identification of main driving forces of growth and the underlying dynamics between demand, supply, and trade.[4]

The chapter is divided into two sections. The first section discusses main macroeconomic transformations and the performance of economic growth during this period. The second section analyzes trade movements and challenges posed for growth. Concluding remarks follow.

2.2 Macroeconomic Changes and Growth Performance

Important economic achievements were observed in the 1990s and 2000s. Two main turning points were the price stabilization in 1994 and the growth acceleration that lasted from the mid-2000s to the beginning of the international economic crisis. Part of these phenomena is explained by international conditions and part by domestic policy orientation. They also carried some inconsistencies regarding major macroeconomic prices, such as interest rates and exchange rate, which led to growth instability.

The economic policy framework of the 1990s followed recommendations of multilateral organizations. Most policies were, indeed, part of conditions imposed by these institutions on countries to obtain loans and, consequently, be able to renegotiate their high external debts. Hyperinflation and external debt were the most critical economic issues in the 1980s for many Latin American economies.

Original "Washington Consensus"	"Augmented Washington Consensus" (additions to the original 10 items)
1. Fiscal discipline	11. Corporate governance
2. Reorientation of public expenditures	12. Anticorruption
3. Tax reform	13. Flexible labour markets
4. Interest rate liberalization	14. Adherence to WTO* disciplines
5. Unified and competitive exchange rates	15. Adherence to international financial codes and standards
6. Trade liberalization	16. "Prudent" capital-account opening
7. Openness to foreign direct investment	17. Nonintermediate exchange rate regimes
8. Privatization	18. Independent central banks/inflation targeting
9. Deregulation	19. Social safety nets
10. Secure property rights	20. Targeted poverty reduction

Fig. 2.1 "Washington Consensus" policy framework. (Source: Own elaboration based on Rodrik (2007). *World Trade Organization)

Figure 2.1 shows the "Washington Consensus" policy framework, mostly implemented by Latin American countries during the 1980s and the early 1990s. It also points to other recommendation policies that emerged in the late 1990s to reply to some criticisms of the reasons why countries, which had adopted initial policies, did not succeed thus far but, on the contrary, were facing financial crises.[5] The choice should be to deepening economic reforms under a second and third generation of reforms based on institutional adjustments focusing on both microeconomic level and macroeconomic prudential regulation (Rodrik 2007; Kuczynski and Williamson 2003).

To a large extent, tariff barriers were reduced, financial markets deregulated, more capital inflows allowed, public expenditures controlled, and companies privatized in Brazil. Such policies were initially adopted in the early 1990s but intensified after the implementation of a new price stabilization plan—"Plano Real"—in 1994, which succeeded in controlling the inflationary process after many attempts in the previous decade (Belluzzo and Almeida 2002).

Two main economic channels contributed to the success of the plan, which was conceived in a context of recovery of international liquidity and fewer restrictions on flows of capital and goods. On the one hand, rising interest rates helped in attracting capital inflows and accumulating

foreign reserves necessary for sustaining the plan. On the other hand, the intensification of trade openness and the establishment of a fixed exchange rate regime allowing for local currency (Real) appreciation against the US dollar (but not its depreciation) resulted in a large amount of artificially cheapened imported goods. Domestic producers were consequently unable to raise their prices (Batista Jr. 1996).

The inflation control provoked an immediate purchasing power gain, benefiting in particular lower income population, whose real income was severely constrained in the previous highly inflationary period. The expansion of consumer credit by banks also contributed to the formation of a consumption boom.

Figure 2.2 shows how positive real Gross Domestic Product (GDP) reacted to the inflation reduction in 1993 and 1994. After a strong shrinkage of industrial GDP in the early 1990s because of sudden and high exposure to foreign competition, industrial GDP recovered to meet the consumption boom. Figure 2.3 makes clear a change in the GDP composition toward an increasing share of household consumption from

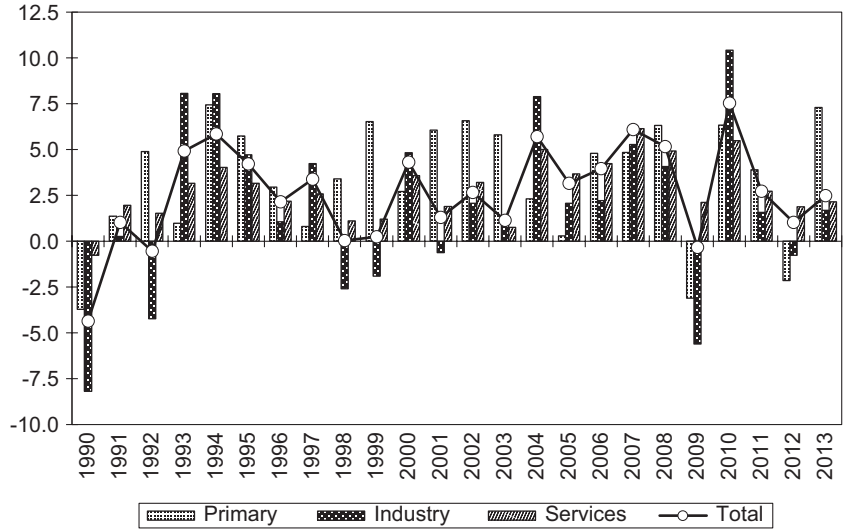

Fig. 2.2 Brazil: Real GDP annual growth rate by sector, 1990–2013 (%). (Source: Own calculations based on Brazilian Central Bank data, available at: https://www3.bcb.gov.br/sgspub (access on: 29 December 2014))

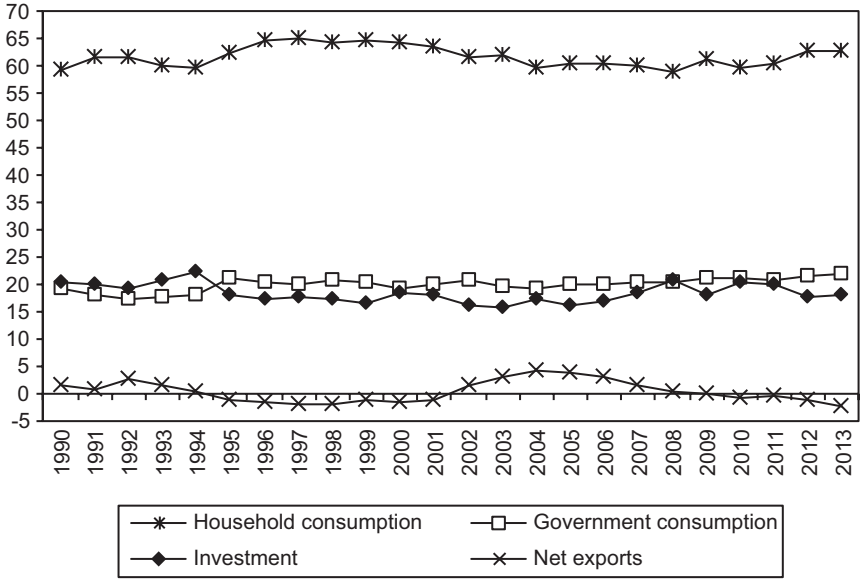

Fig. 2.3 Brazil: GDP composition by expenditure, 1990–2013 (%). (Source: Own calculations based on World Development Indicators of the World Bank, available at: http://databank.worldbank.org (access on: 30 July 2014). Note: The sum of the share of all four expenditure components for each year equals 100%)

that moment on. Investment, in turn, which is regarded as the main engine of high growth rates,[6] reduced its share in total GDP. Investment rate dropped to less than 20% of GDP.

Inflation control, however, was made possible at high costs to domestic industry and balance of payments, thus placing subsequent constraints on economic growth. Real GDP growth started to decrease after 1995 due to a slowdown of domestic industry, as Fig. 2.2 shows. Investment rate remained considerably low while the consumption share of GDP was extremely high, leading to a worsening of net exports share (Fig. 2.3). In a scenario of industry losing dynamism and pressure of consumption favored by appreciated exchange rate, rising imports started to fill the gap.

Every time the economy started to grow, the current account deficit enlarged, as shown by Fig. 2.4. It resulted from not only trade balance, negative from 1995 to 2000, but also income transfers abroad, including, for example, profit and dividend remittances and travelling expenditures.

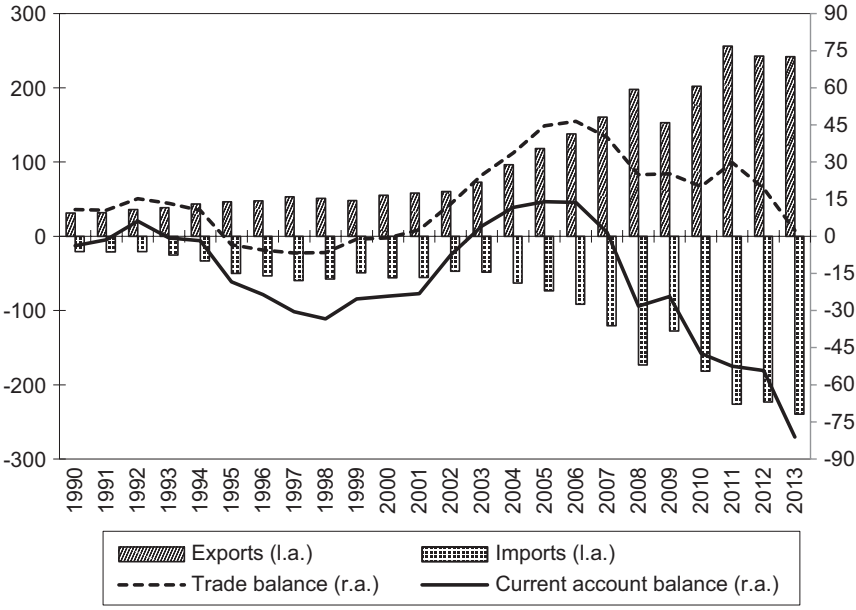

Fig. 2.4 Brazil: Trade and current account balances, 1990–2013 (US$ billion). (Source: Own calculations based on Brazilian Central Bank data, available at: https://www3.bcb.gov.br/sgspub (access on: 29 December 2014). Note: *l.a.* left axis, *r.a.* right axis)

In order to avoid balance of payments constraints challenging the maintenance of the foreign exchange regime, increasing interest rates turned into a recurrent policy tool. Either used for attracting more capital inflows (also, preventing capital flights from the country when financial crises elsewhere started to happen) or imposing restrictions on credit to slow the economy down and reduce imports, it produced a "stop and go" process of growth (Delfim Netto 1998).

This economic adjustment was harmful both to public finances and to the real sector. On the one hand, higher interest rates augmented public debt and debt service payments, which were the main determinant of public deficits (Tavares 1998). In order to adjust its budget and following the "Washington Consensus" framework, the government accelerated the process of privatization[7] and implemented contractionary fiscal policy by increasing taxes and cutting public expenditures.

On the other hand, a combination of adverse factors started to challenge the capacity of the diversified domestic industry Brazil had developed to promote growth and employment as before.[8] Economic issues that contributed to a disarticulation of some domestic productive chains at that moment were: (1) massive capital inflows oriented to privatizations in the form of mergers and acquisitions; (2) overvalued exchange rate favoring imports of inputs and final goods that, consequently, intensified foreign competition at home market; (3) high interest rates; and (4) unfavorable long-term horizon for investments given the prospects of low levels of aggregate demand (Coutinho 1997).

Growing imbalances in external accounts and the speculation against the domestic currency made the foreign exchange regime unsustainable, leading to a strong depreciation of the Brazilian currency at the beginning of 1999. In this regard, one should notice the increasing current account deficits (Fig. 2.4) and the losses of foreign reserves previously accumulated until 1996 (Fig. 2.5).

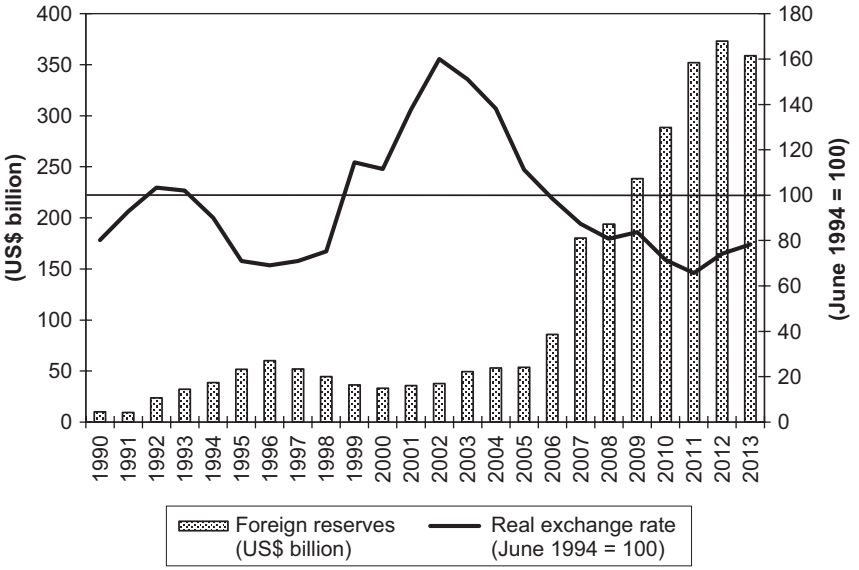

Fig. 2.5 Brazil: Foreign reserves and real exchange rate, 1990–2013. (Source: Own calculations based on Brazilian Central Bank data, available at: https://www3.bcb.gov.br/sgspub (access on: 29 December 2014). Note: Real exchange rate annual average expressed as local currency (Real) per US dollar)

A change in the macroeconomic regime followed. Since then, the macroeconomic regime has been grounded mostly on floating (but managed) exchange rate, inflation targeting, and primary budget surplus. The main tool used to get inflation rate within a pre-set inflation range has become the management of short-term interest rates, as policy recommendation of the "New Consensus Macroeconomics" approach (Arestis 2007).

In order to prevent deviations of inflation rates up from the target, government sets higher levels of interest rates. This is negative to economic growth, once they spoil credit and, thus, investment and consumption. Additionally, high interest rates—more precisely, large differentials between domestic and international interest rates—tend to enlarge capital inflows, particularly portfolio capital, in a context of deregulated financial markets. As a result, domestic currency appreciates and, in turn, tends to increase imports. This process puts pressure on current account balance and domestic productive chains, especially at moments of low expectations of economic growth.

High interest rates also increase public debt and then require a fiscal budget adjustment to guarantee the achievement of primary budget surplus, a sign to markets that the government has sound finances and its debt is a safe investment. This fiscal adjustment usually requires cuts in public investments, infrastructure and social expenditures, or tax increases. Therefore, the macroeconomic regime focused mainly on inflation targeting poses challenges for high economic growth.

From 1999 to the international economic crisis at the end of 2008, the Brazilian economy experienced two different periods. Two deep depreciations of domestic currency marked the first period: one as result of the Brazilian crisis and the demise of the fixed exchange rate regime in 1999, and other as result of presidential elections in 2002 given foreign investors' initial fear of the Labor Party's victory (Fig. 2.5).

The early 2000s also observed an energy crisis in Brazil, the Argentinian crisis, and the terrorist attacks in the United States, which influenced the Brazilian economy given the importance of both countries as trade partners. High volatility in exchange rates, high interest rates, and relative stagnation of the world economy affected adversely domestic economic growth. The low dynamism of the Brazilian economy, however, contributed to a slowing recovery of external accounts (Figs. 2.2, 2.3 and 2.4).

Economic growth and external accounts only showed clear signs of recuperation in the second period, which started with major changes in international conditions, such as international liquidity recovery, increasing commodity prices and rising Chinese demand for commodities after 2003. Given that primary goods represent a large share of Brazilian exports, these movements contributed to huge trade and current account surpluses (Fig. 2.4). Consequently, net exports increased in the GDP share (Fig. 2.3), and a new opportunity for foreign reserves accumulation arose, representing a shield against external shocks (Fig. 2.5).

Nonetheless, a cycle of economic growth was only achieved after the implementation of some domestic policies regarding investment and income distribution. Main policy changes included: (1) expansionary monetary policy by decreasing interest rates; (2) consequent credit expansion as percentage of GDP and deliberate policy of the National Economic and Social Development Bank (BNDES) to support productive capacity growth; (3) proposals of infrastructure and investment programs, such as the National Program for the Acceleration of Growth (PAC); (4) strong increase in real minimum wages and formal employment creation on a large scale; and (5) enlargement of income transfer programs, such as "Bolsa Família", benefiting poor families and regions in Brazil.

Favorable international conditions and the combination of credit expansion, real income gains, and intense employment creation turned into increasing prospective demand and higher expectations for private investments. Once made, investment decisions reinforced the boom in the business cycle. The investment rate that had remained considerably low until the mid-2000s regained momentum, despite its difficulty in surpassing 20% of GDP, which has been led by a large consumption share over the entire period (Fig. 2.3). Industry growth was accompanied by growth in services and primary activities as well (Fig. 2.2).

The international economic crisis, however, hit severely the booming economy at the end of 2008 and, especially, in the following year (Fig. 2.2). In response to the economic downturn, the government adopted several countercyclical policies. Tax reduction on goods of some sectors, such as automobile industry, construction, and home appliances, was implemented. There was also expansion of credit led by public commercial banks and BNDES, for instance, to government housing policy

and restructuring of private companies incurring losses during the crisis. Among other policies, the government started to impose taxes on capital inflows, particularly in foreign exchange derivatives markets, in order to control currency appreciation and volatility.[9]

Initial countercyclical policies were successful in boosting industry and the overall economy in 2010, shortly after the economic slump in the year before, when negative GDP growth was registered. However, the deterioration of both external and domestic conditions has put the economy back into a situation of low dynamism since then[10] (Fig. 2.2).

One of the key issues underlying growth imbalances was the persistence of domestic currency appreciation, a trend observed during the whole growth cycle in the 2000s (Fig. 2.5). Despite contributing to controlling inflation and raising real wages in the short term, this trend has put pressure on domestic industrial production and current account balance over time (Fig. 2.4). Rising import amounts as well as income deficits, enlarged by interest payments for foreign portfolio capital and increasing profit and dividend remittances, resulted in current account deficits, notably after the crisis had taken place.[11]

This seemed a manageable problem during the economic boom but turned into a serious concern once both international and domestic business cycles had changed.[12] Next section discusses major trade movements and challenges that they have posed for sustained growth over the 1990s and 2000s.

2.3 Trade Movements and Challenges for Growth

Brazilian economic growth has been intensely relying on consumption. Investment and industrial growth have played an important role more recently, a process interrupted by the international economic crisis, however. Trade movements have been underlying the growth trajectory, which has experienced important changes over the whole period.

As already remarked, post-stabilization growth was based on consumption boom favored by inflation control, immediate real income gains, and appreciated exchange rate. The dynamics of interest rates and exter-

nal accounts, nonetheless, undermined the macroeconomic regime and any chance of sustained high growth rates. The economic adjustment after 1999 was severe and only changes in international conditions together with the implementation of domestic policies regarding investment and income distribution were able to bring Brazil back to higher growth rates in the mid-2000s.

This growth period, which was benefited by rising exports, decreasing interest rates, credit expansion, and real income gains, also carried its own imbalances. These demand stimuli were not absorbed completely by domestic production, resulting in an increasing gap filled by imports (Fig. 2.6). This movement was even more pronounced after 2011, under the developments of the crisis, when the amount of exports did not follow the amount of imports at the same pace. It caused a sharp reduction in trade surpluses and, consequently, contributed to growing current account deficits (Fig. 2.4).

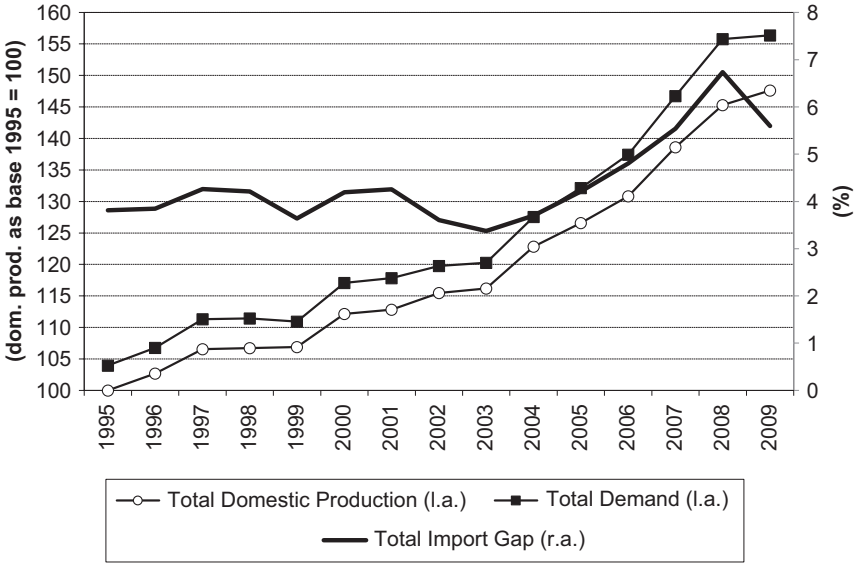

Fig. 2.6 Brazil: Total demand, domestic production, and import gap, 1995–2009 (base 1995 = 100 and %, at 2009 constant prices). (Source: Own calculations based on Brazilian tables of the World Input-Output Database. See details at Appendix. Note: *l.a.* left axis, *r.a.* right axis)

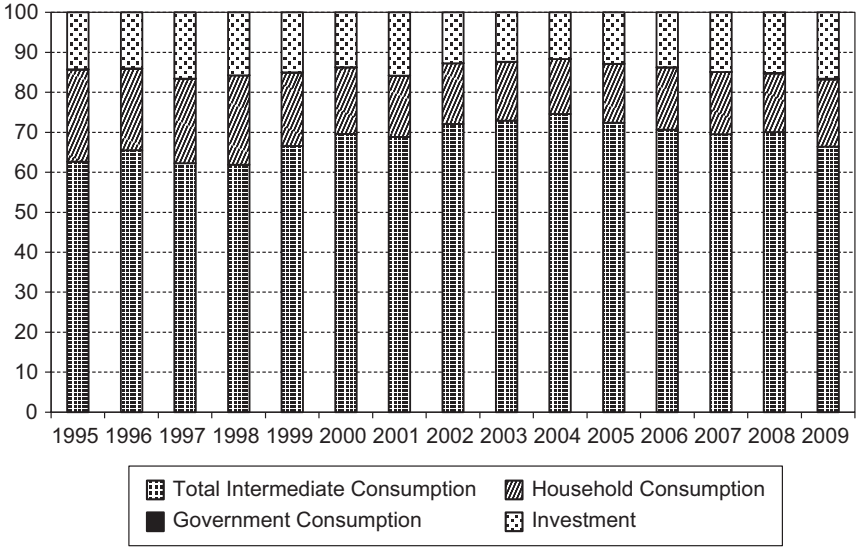

Fig. 2.7 Brazil: Share of total imports by components of domestic demand, 1995–2009 (%, at 2009 constant prices). (Source: Own calculations based on Brazilian tables of the World Input-Output Database. See details at Appendix. Note: The share of government demand for imports is very small)

Most imports have been used as inputs in domestic production. This share, which was nearly 60% in 1995, registered 70% in 2008, just before the crisis downturn. At the beginning, a large share of imports (above 20%) was destined to household consumption as final goods (Fig. 2.7). The overvalued exchange rate favored a rising amount of imports.

This scenario changed after the 1999 currency crisis. The slowdown in imports was followed by a change in its composition. As final demand was growing at a slow pace, imports were increasingly used for intermediate consumption. Growth recovery after 2004 led to rising imports, which although greatly used as inputs in domestic production were accompanied by a growing share for investment (Fig. 2.7).

The observed investment growth in this period was, therefore, associated with considerable increase in investment-related imports. This process may be necessary to sustain growth in a developing economy that requires foreign technology but it may also pose a threat to domestic

production whether machinery and its components become mostly imported, instead of fostering domestic capabilities and domestic interindustry linkages.

Import coefficients showed a remarkable increase concomitantly to the growth cycle after 2004. Total import penetration coefficient (TIPC), which relates total imports to total output for domestic demand, almost doubled from 2003 to 2008. This coefficient also increased in the mid-1990s but to a lesser extent (Fig. 2.8).

Total imported input coefficient followed a similar trend. It pointed to a growing dependence of economy's output on imported inputs, as it considers direct and indirect relations between sectors and their suppliers of imported inputs along the productive chain (Fig. 2.8). Imports were favored by appreciated exchange rate but they also, in part, contributed to support economic growth.

In the 1990s, the difference between both import coefficients decreased, as a result of the trend of rising imports of goods to meet final demand rather than intermediate consumption. During the growth recovery period

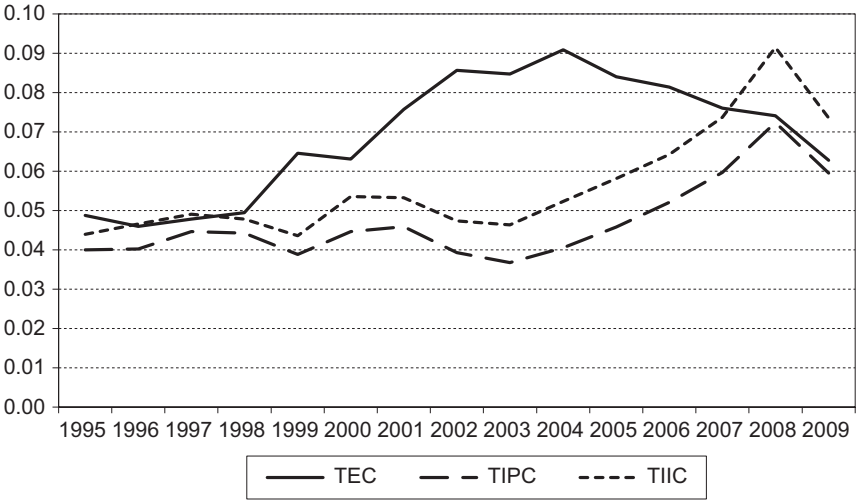

Fig. 2.8 Brazil: Trade coefficients, 1995–2009 (at 2009 constant prices). (Source: Own calculations based on Brazilian tables of the World Input-Output Database. See details at Appendix. Note: *TEC* Total Export Coefficient, *TIPC* Total Import Penetration Coefficient, *TIIC* Total Imported Input Coefficient)

in the 2000s, the difference remained stable, despite bigger, as components were growing steadily. However, from 2007 onward, trade imbalances have become more evident (Fig. 2.8).

The dynamic of export coefficient helps explaining why rising imports were not unsustainable at that moment as before, back in the 1990s. Total export coefficient remained almost stable in the late 1990s. It registered, however, lower values than the total imported input coefficient for some years (Fig. 2.8). This movement is linked to the trade deficits observed in the period that placed huge constraints on economic growth (Fig. 2.4).

Total export coefficient dramatically increased thereafter, much above and earlier than import coefficients. In the early 2000s, part of this trajectory was due to the slow dynamism of domestic economy. Nevertheless, changing international conditions boosted exports in the following years. From 2004 to the beginning of the crisis in 2008, even though exports were continuously rising, domestic production was increasing more rapidly as result of overheated domestic demand, causing export coefficient to fall (Fig. 2.8). Export boom alleviated pressures on growth and, indeed, was the key to reduce external vulnerability as it promoted together with huge capital inflows a large accumulation of foreign reserves (Fig. 2.5).

A major concern arose when import coefficients surpassed export coefficient and, shortly after, as the international crisis broke out. It also exposed another imbalance, namely the growing mismatch between exports and imports of manufacturing goods. Manufactures imports as percentage of merchandise imports have been higher than manufactures exports as percentage of merchandise exports during the whole period, but the difference between them considerably accentuated over time, particularly after the crisis (Fig. 2.9).

In the early 1990s, manufactures imports represented about 60% of imported goods. Its rising trend was accompanied also by an increase in the share of manufactures exports, which reached almost 60% in 1993. These trends dramatically changed after price stabilization and economic reforms toward trade liberalization. Manufactures imports accelerated at the fastest pace over the entire period and registered the peak of 76.3% of total merchandise imports in 1998. The share of manufactures exports, in turn, decreased to a stable level lower than 55% in the late 1990s (Fig. 2.9).

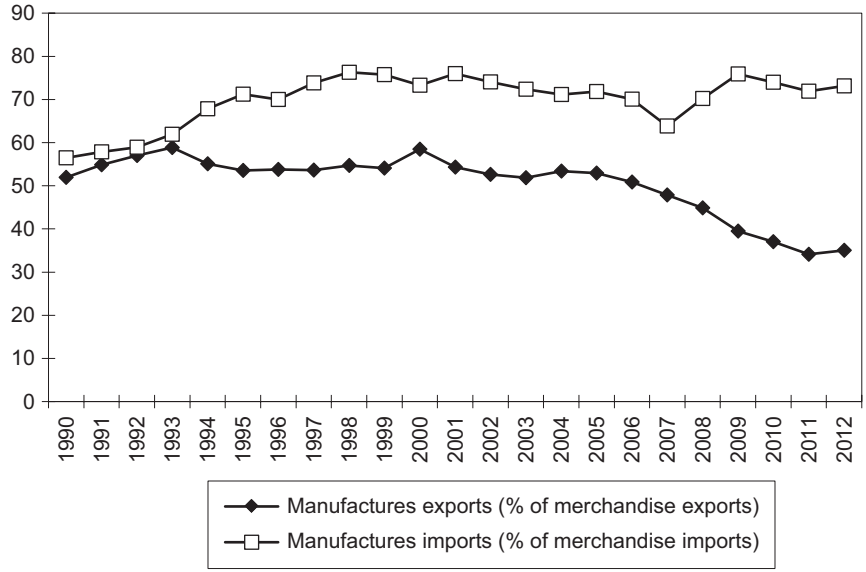

Fig. 2.9 Brazil: Manufactures exports and imports, 1990–2012 (% of merchandise exports and imports). (Source: Own calculations based on World Development Indicators of the World Bank, available at: http://databank.worldbank.org (access on: 30 July 2014))

In the early 2000s, manufactures exports as percentage of exported goods reduced even more to near 50%. The share of manufactures imports also decreased but remained high (above 70%). Following the changes in international conditions, such as increasing commodity prices and rising Chinese demand for commodities, the share of manufactures exports in Brazilian total merchandise exports declined more, as primary goods were increasingly representing a larger share in the economy's total exports.

Manufactures exports accounted for less than half of total exports for the first time in 2007. Due to the slow dynamism of domestic industry during the crisis, this share achieved less than 35% in 2011, the lowest level in this series. The share of manufactures imports remained quite stable though high—around 70%—during the growth cycle in the mid-2000s but increased a little after the crisis outbreak, ranging between 70% and 75% in the following years (Fig. 2.9).

Therefore, the export boom was led mainly by exports of primary goods. Manufactures imports, in turn, remained considerably high, even during periods of economic slowdown. These movements reflect changes in the domestic productive structure and exposes part of the fragility Brazilian industry has been facing. Hence, they pose further challenges for a sustained process of growth recovery.

2.4 Concluding Remarks

Brazil has registered mostly erratic growth rates during the 1990s and 2000s. The economy has experienced some particular but unsustainable growth cycles, whose imbalances have been greatly attached to trade movements. In general, the Brazilian growth pattern has been mainly based on consumption. A major share of its GDP has been destined to meet household consumption in the recent past. Investment rates have remained low, which may explain partially the unsustainable growth performance observed in the economy over the years.

Nonetheless, important changes in the growth pattern were noticed from the mid-1990s to the mid-2000s. Price stabilization provoked an immediate consumption boom but the macroeconomic regime based on overvalued exchange rate and high interest rates increasingly undermined the continuity of economic growth. Trade and current account imbalances ended in the 1999 currency crisis.

Favorable international conditions and changes in domestic policy orientation boosted the economy again in the 2000s. Export boom, led by exports of primary goods, contributed to large trade surpluses for a long period. Because of the export boom and huge capital inflows, Brazil accumulated an increasing amount of foreign reserves, which worked to reduce its external vulnerability.

Domestic market also regained momentum due to credit expansion, real income gains, and high employment rates. Decreasing interest rates, despite being still very high, and appreciated exchange rate were underlying these movements. At that moment, Brazil was a growing economy with its domestic market in expansion. Although investment rates remained quite low, they increased considerably and played an important role in the growth cycle.

However, the heavy reliance on domestic market as a source of demand has not been followed completely by domestic industry. The increasing mismatch between domestic demand and supply started to challenge the growth cycle. Imports filled the gap and an increasing share of foreign supply was of investment-related imports.

Additionally, imports of manufacturing goods have been representing more than 70% of total imports since the mid-1990s, while the share of manufacturing exports has been declining. This fact clearly shows a key imbalance in the economy concerning trade and production structures.

What seemed a minor problem during the economic boom turned into a serious constraint during the international crisis. Demand stimuli provided after the world economic slump at the end of 2008 were accompanied by increasing foreign supply of imports. Domestic demand reacted to stimuli at a faster pace than output. Consequently, the mismatch between domestic demand and supply accentuated and current account deficits enlarged, posing further challenges to growth recovery.

Once again, Brazil is facing growth constraints. In this regard, two major challenges remain to put the economy back into a sustained growth cycle from the experience observed in the 1990s and 2000s. The first challenge refers to the necessity for a considerable increase in the Brazilian investment rate (above its 20% of GDP barrier). Domestic demand is sharply declining, thus requiring particular attention to make it recover again. The second challenge arises from the difficulty in promoting a compatible response of domestic supply to meet both final and intermediate demand and, therefore, to use demand opportunities, when they exist, to boost economic growth.

Appendix: Methodological Notes on Input-Output Analysis

This appendix shows calculations of indicators used in this chapter that apply Brazilian input-output tables released by the World Input-Output Database (WIOD). Input-output tables are built according to Brazil's official tables and consistent estimates by WIOD considering the same level of sectoral aggregation that may vary in original national account tables. Available data cover the 1995–2009 period only.[13]

WIOD input-output tables are disposed at basic prices and industry-by-industry format. In order to make them comparable over the years, tables at current prices and previous year's prices were used to transform current prices into constant prices of the last available year (2009).

According to the input-output framework, total output in the economy (X) is given by the sum of output for intermediate consumption (Z) of different sectors and output for final demand (Y), as in (2.1). The matrix of interindustry flows (Z) and the total output allow for the calculation of the matrix of technical coefficients (A). The technical coefficient (a_{ij}) measures, in monetary terms, how much of goods the sector j has used from the sector i for its total output. In other words, it shows the proportion of inputs purchased by sector j from sector i in relation to the total output of sector j, as in (2.2).[14]

$$X = Z + Y \tag{2.1}$$

$$a_{ij} = \frac{Z_{ij}}{X_j} \tag{2.2}$$

It follows that:

$$X = A \cdot X + Y \tag{2.3}$$

The solution to this equation gives the total output necessary to meet the final demand:

$$X = \left(I - A\right)^{-1} \cdot Y \tag{2.4}$$

where $(I - A)^{-1} = L$ is known as the Leontief inverse or the total requirements matrix.

The basic Leontief model allows for several analyses of the productive structure and trade coefficients. This chapter focuses on trade coefficients, including export and import coefficients, which contribute to the understanding of the evolution of demand and production.

Like the intermediate consumption matrix (Z), the final demand matrix (Y) shows sectoral and total output demanded by each final

demand component, namely household consumption, government consumption, investment, and exports. Thus, the total export coefficient (TEC) is given by the share of the economy's total output which is destined to exports, as in (2.5). The bigger the export coefficient, the greater the orientation of domestic production to exports.

$$\text{TEC} = \frac{i' \cdot e}{i' \cdot x} \tag{2.5}$$

where i' is a row vector of 1's, e is the vector of exports and x is the vector of output.

For import coefficients, the matrix of imports by sector (M) is used, once it shows how imports are distributed across the economy. Total imports are directed either to intermediate consumption (Z_m) of different sectors or to final demand (Y_m) except for exports, as in (2.6). Given M, one can calculate the share of total imports by components of domestic demand, that is, intermediate consumption, household consumption, government consumption, and investment.

$$M = Z_m + Y_m \tag{2.6}$$

Total import penetration coefficient (TIPC) accounts for the share of imports in non-exported total production. That means, imports are added to and exports subtracted from the denominator of total output, resulting in Eq. (2.7). The bigger the import coefficient, the higher the share of imports to meet domestic demand.

$$\text{TIPC} = \frac{i' \cdot M \cdot i}{i' \cdot x + i' \cdot M \cdot i - i' \cdot e} \tag{2.7}$$

where i' is a row vector of 1's, i is a column vector of 1's, M is the matrix of total imports, e is the vector of exports, and x is the vector of output.

Total imported input coefficient (TIIC), in turn, provides a deeper perspective on the density of domestic productive chains. It considers direct and indirect coefficients of imported inputs, that is, imported

inputs from each sector, its suppliers and so forth. Results point to the dependence of the economy's monetary unit of output on imported inputs.

Total imported input coefficient is calculated as the weighted average of sectoral imported input coefficients by the share of each sector's production in total output, as in (2.8). Sectoral imported input coefficients are obtained using the Leontief inverse based on technical coefficients of domestic production and the matrix of direct coefficients of imported inputs (A_m), whose coefficients are similar to (2.2) but derived from the matrix of imports for intermediate consumption (Z_m).

$$\text{TIIC} = \left\{ i' \cdot \left[A_m \cdot \left(I - A \right)^{-1} \right] \right\} \cdot x_{\text{share}} \tag{2.8}$$

where i' is a row vector of 1's and $x_{\text{share}} = \dfrac{x}{i' \cdot x}$, that is, the vector of output by sector (x) divided by total output.

Finally, the total import gap is the share of total imports in total demand. In other words, it represents the gap between total demand and total domestic production that is covered by imports.

Notes

1. See O'Neill (2011), IMF (2011) and World Bank (2011).
2. For a critical analysis, see Palma (2013).
3. Expression coined by Williamson (1990) to express the economic approach on which recommendation policies of multilateral institutions, such as the World Bank and the International Monetary Fund (IMF), for developing economies in the 1980s and 1990s were based.
4. Data from the World Bank, the Brazilian Central Bank, and the World Input-Output Database (WIOD) are used in this chapter. For more details on the input-output methodology, see Appendix.
5. Most remarkable financial crises during the 1990s were Mexican, Asian, Russian, and Brazilian crises in 1994, 1997, 1998, and 1999, respectively.
6. See Keynes (1936, 1937) for a theoretical discussion on the importance of investment for the determination of the level of economic activity.

7. Privatization was regarded as a way to improve efficiency of services offered by state enterprises and obtain funds to control public budget. Many previously state-owned companies, such as CSN, Embraer, and Vale, created in 1941, 1969, and 1942, were privatized in the 1990s, more specifically in 1993, 1994, and 1997, respectively. This process of privatization also involved many telecommunications, electricity, and banking companies, particularly in the second half of the 1990s (Fleury and Fleury 2009).
8. See Chang (2002) and Cimoli et al. (2009) on the importance of fostering domestic industry for economic growth.
9. For a vast discussion of economic policies adopted in Brazil in face of the international crisis and years thereafter, see Modenesi et al. (2012) and AKB (2013).
10. This chapter does not deal with the domestic recession that the Brazilian economy has been facing since 2014 but with structural demand-supply imbalances underlying its trajectory before.
11. In the face of the international crisis, some transnational corporations have promoted massive profit and dividend remittances from subsidiaries in profitable and in expansion emerging markets, such as Brazil, to their headquarters in developed economies in order to offset big losses they were incurring since the crisis.
12. See Borghi (2015) for a detailed discussion.
13. Data were collected in 2012 when tables at both current prices and previous year's prices were available at: http://www.wiod.org. For more information about WIOD tables, see Timmer (2012).
14. For more details, see Miller and Blair (2009).

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3

The Competitiveness of Brazilian Manufacturing in Both Domestic and International Markets

Marta Castilho, Julia F. Torracca, and Fabio N. P. de Freitas

3.1 Introduction

Brazil's international trade has shifted significantly in the last decade. Despite the intense trade flow growth, a huge change in the composition of exports has taken place. Manufacturing has lost share in exports to agricultural and mineral commodities, whose increase was strongly influenced by the sharp rise in their international prices. However, during the 2000s, Brazilian manufacturing exports has managed to expand at higher rates than global manufacturing exports due mainly to the dynamism of sales to its Latin American neighbors.

Despite the positive contribution of exports to the Brazilian economic performance in the period 2000–2012, that was not the main cause

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behind the growth in industrial production. The domestic demand was by far responsible for it as domestic consumption grew at a rapid pace, as a consequence of wage increases and credit expansion. The average growth rate of industrial production in the period was of 10% per year.[1] The international financial crisis interrupted that 'virtuous' process in 2009, though its immediate impact, in Brazil, was not very strong or long-lasting, as the economy recovered in 2010. However, from 2011 on, the slow recovery of the US economy and the Euro crisis has not only affected their demand for Brazilian exports (and also for the exports of other Brazilian partners) but also induced Asian countries—especially China—to look at Brazil and Latin America's (LA) other markets with more interest. As a consequence, Brazilian industrial goods have begun to face a stronger Asian competition from 2009 on, both in domestic and foreign markets.

One may note that there is a significant difference between Brazil's trade and production structures. While agricultural and mineral commodities are a major part of Brazilian exports, their role in domestic production is minor. Production is much more diversified than exports, even if a long-term tendency of specialization is observed. However, the divergences between both structures have been decreasing in the last three years.

In the scenario at the international level, world trade flows showed important modifications during the last 20 years, which reflect structural changes in world production. Fragmentation of production processes together with other factors such as trade cost reductions and technology evolution have led to a separation and reallocation of industrial activities (tasks, as it's called in trade literature—see Helpman 2011) to different countries, according to each country's comparative advantages in each activity/task. In this new configuration, a key feature is the emergence of international trade and production networks or, to use a different terminology and conceptual approach, the emergence of global value chains (GVCs).

Having in mind both these conjectural and structural changes in the global economy, this chapter aims to analyze the competitiveness of Brazilian manufacture both in the international and the domestic market. As will be mentioned below, a first look at the Brazilian exports composition would suggest that manufacture production has been declining along the decade. Even if there is a loss of competitiveness of Brazilian manufacture, its performance in national and international markets are significantly different, with distinct factors influencing each market. We show

then their evolution, emphasizing the difference between the competitiveness in national and international markets. We examine first the international insertion of Brazilian manufacture, considering the two aspects already mentioned—on the one hand, the evolution of international prices and its consequences on the structure of Brazilian and global trade and, on the other hand, the development of global trade and production networks. Secondly, we analyze the penetration of foreign goods and the import content of domestic demand in order to understand the evolution of Brazilian manufactured goods' competitiveness in its domestic market.

The methodology for analyzing the competitiveness in the international market includes estimates of structural indicators and indicators related to the country's insertion into GVCs, based on data extracted from the World Input-Output Database (WIOD) and from Trade In Value Added—TiVA (OCDE). The methodology for analyzing the competitiveness in the domestic market includes the estimation of import penetration ratio and the import content in the intermediate and final production, based on data extracted from the Brazilian Input-Output Table.

The rest of the chapter is organized as follows. Section 3.2 presents a theoretical review of the literature on production fragmentation and its impact on a country's competitiveness. Section 3.3 focuses on the competitiveness of Brazil in the international market using indicators of domestic and foreign value added. Section 3.4 examines the competitiveness of Brazilian manufacturing on the domestic market relying on the analysis of the imports penetration and the import content of domestic demand. The last section presents some concluding remarks.

3.2 Fragmentation of Production and Global Value Chains: Impacts on the Competitiveness of Manufacturing

World trade has changed significantly since the 1990s and so have the patterns of international flows of goods. It was characterized by strong fluctuations in the 2000s, followed by a sharp increase that lasted until the financial crisis of 2008 and the loss of momentum that followed.

Shifts in industry-related and geographic aspects of world trade profile are related to the reorganization of production at a global level due to the increased fragmentation of production processes along several stages and across multiple regions.

Technological and organizational changes in industrial production have allowed the breaking of vertically integrated production processes into fragmented production stages.[2] A progressive decline in transportation and communication costs has followed and led to the reallocation of production stages in different regions or across countries, allowing international production networks to emerge (Jones 2006). Fragmentation has been driven by multinational enterprises (MNEs) with high operational capacities, which started to transfer production sites or to outsource specific tasks to other countries in search of lower operational costs. That is, by means of international outsourcing or vertical foreign direct investment, MNEs outsourced parts or stages of their production processes with a view to profit from the competitive advantages of each country in performing specific tasks or production stages and not in undertaking the whole production of final goods, as it used to be. This type of fragmentation has been progressively adopted by firms of different sizes and has affected a growing number of industries and countries.

Technological changes and the performance of MNEs have been crucial to the increasing reorganization of world trade and global production, while the decline of transaction costs among the many firms or business units involved in the production of a given good has been decisive. Coordination costs among the many units in charge of the different production stages have declined due to decreased transportation and communication costs and lower trade barriers associated with trade liberalization in many countries.[3] The reduction of trade barriers at both a multilateral and a regional level and trade agreements became more comprehensive including issues beyond the flow of goods and services.[4]

Therefore, the progressive reorganization of production into international—global or regional—trading and production networks offers multiple possibilities for value creating and sharing among the participants and encompass different operations, from the design of a product to the production of parts and components, the assembly of its parts, and marketing-related activities. Along the process of value creation, aspects concerning

productive technology, patterns, and regulation are relevant to determine market structures and spaces of competition between firms.[5]

As part of this process of reorganization of production at a global level, firms now compete not only in markets of final goods but also in business functions along several production chain stages. Consequently, the international flow of intermediate goods has grown significantly in the past two decades. Additionally, the role of services and its contribution to value creation in manufacturing have grown in size and relevance as well.

Globally interconnected production networks affect national economies more directly, from the point of view of both the macroeconomic framework and trade and industrial policies. As for the macroeconomic perspective, this new scenario brings into focus issues related to national economies being more susceptible to the transmission of financial shocks originated elsewhere or to the scale of results in the bilateral balance of trade. Indeed, traditional trade measures at first overestimate the importance of countries located at final stages of value chains especially because they produce more final products—thus underestimating the relevance of other stages of value chains which are as significant as the final ones (Bayoumi et al. 2013). Therefore, trade estimates based on value added and the share of traded products which is actually undertaken locally might result in a significantly changed trade profile among countries.[6]

As for the trade and industrial policies, policy instruments should stimulate and support countries to participate more (and in a more beneficial manner in terms of value creation) in international trading and production networks. A number of authors argue that a country's insertion into value chains or stages is directly related to the adoption of a more comprehensive trade liberation policy (Bayoumi et al. 2013). Sturgeon et al. (2013) say that the movement of global fragmentation of production actually hinders the debate on industrial policy. The reason, they argue, is that domestic industries are no longer believed to be isolated from the competition as they used to be in the days of more protectionist policies, key industries, and "national champions" policies, or even local content policies. According to them, policy instruments should aim at strengthening activities/segments that are more prepared to join high value chains and thus prioritize a type of industrialization oriented to a more comprehensive liberation, high foreign direct investments, global outsourcing, connecting industries to complex, overlapping business networks.

However, not all countries are able to join higher value-added segments, as the international fragmentation of production tends to favor the owners of intangible, knowledge-intensive assets, such as R&D, trademarks, and marketing services (Medeiros 2010). In respect to that, the idea of competitiveness now goes beyond to a country accumulating capabilities to successfully compete in specific international markets but includes capabilities to get ahead in value chains in a scenario of interdependent and relative competitiveness. That debate is particularly relevant to developing countries, especially Brazil.

Due to the increasing fragmentation of production, international competition is now multifaceted; a given industry may include activities with different weights to value creation, while a sole segment may be connected to several families of industries. As Timmer et al. (2013) point out, the logic of competitiveness is now less based on "what a country sells" and more based on "what a country does". In this case, a good export performance based on the production of final goods not necessarily represents a more solid position in global context since the knowledge about marketing activities and commercialization could generate more value. This is because those kinds of activities are themselves parts of upgrading process in the context of GVCs.

Hence, conventional measures of competitiveness may be unable to reflect the value added by the activities performed within GVCs. Moreover, due to countries' growing interdependence in the production process shown in the intermediate consumption originated in imports, the competitiveness gains of a nation in a given segment may correspond to a competitive advantage of another country—the concept of competitive interdependence.

The main issue involving value-added measures used to be how to obtain them and, once they were available, how to relate them to the concept of competitiveness. At first, measures of international fragmentation of production were based on measures of vertical specialization[7] of countries, the share of parts and components trade, or case studies of specific chains. Recently, international organizations have jointly developed world input-output matrices, which have allowed the use of a new approach to analyze nations' competitiveness by combining national accounts and trade data.

3.3 The Competitiveness of Brazilian Manufacturing in International Markets

Manufactured goods take a relevant but decreasing part in Brazilian exports. Indeed, the composition of Brazilian exports has shifted significantly in the past 40 years. In the 1980s, manufactured goods gained relevance, but in the beginning of the 1990s that growth trend started to revert and in the year of 2000, it reverted dramatically (see Fig. 3.1). The share of manufactured goods in 1995 was 84.3%; this value decreased by 23 percentage points as a share of total exports. In the composition of Brazil's exports, minerals gained more importance than agricultural commodities and they together accounted for 38.7% of total exports in the last observed year (2012). If we also consider processed agricultural commodities—such as ground soybeans and other food products like meats, for example—their share of natural resource-based products become more significant.[8]

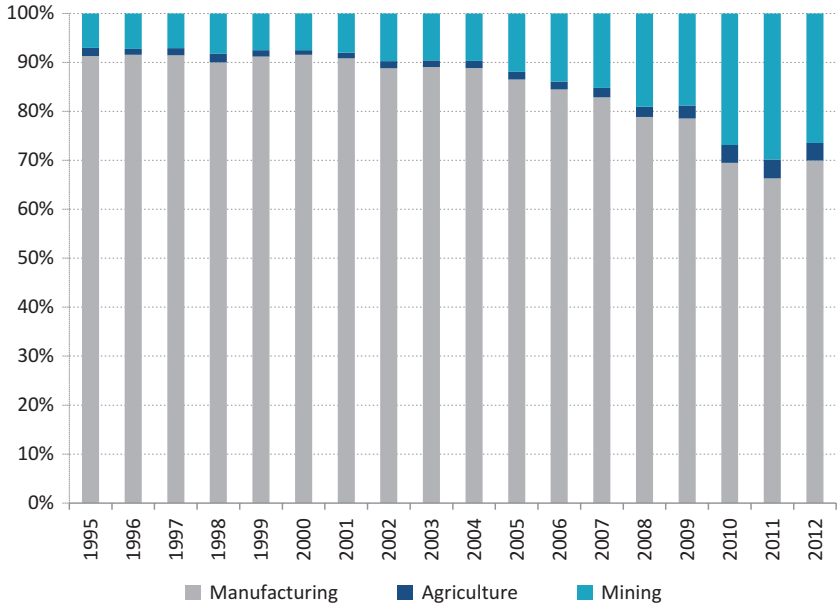

Fig. 3.1 Evolution of the composition of Brazilian exports—1995–2012 (in %). (Source: Authors' elaboration based on data from Comtrade—UN)

The recent tendency toward "re-primarization" of exports is both an effect of the increased demand for primary goods and the evolution of commodity prices in the international market throughout that decade (both phenomena are, indeed, related). In addition to the increasing demand for primary goods, especially among Asian countries, the financialization of commodity markets and the undervalued dollar compared to other currencies also made a contribution to that evolution.[9] Serrano (2013) points out many other factors related to the supply of commodities that also influenced. Most of them are product-specific, such as the control of oil supply by Organization of Petroleum Exporting Countries (OPEC), the stagnant production capacity in mining industries, or the growth of biofuel production; other factors are more generic, such as the appreciation of producers' national currencies or the so-called "nationalism of natural resources".

Because of increased demand and escalated prices, the value of commodities expanded not only in terms of unit prices but also in terms of the quantum of exports. That expansion took place in a scenario where Brazil faced currency appreciation, and, for exporters, the escalation of international prices more than compensated the potential effects of currency appreciation. Prices of mineral commodities rose above the average price of agricultural commodities. Additionally, the evolution of agricultural commodity prices as a whole was less homogeneous, with a number of products having their prices escalated differently from others.[10] Notwithstanding, increased agricultural commodity prices at an international level benefited the most relevant products in Brazil's exports, such as soy and coffee beans.

Despite growing relatively less than exports of agricultural and mineral commodities, exports of manufactured goods have followed a path in the international market that is not odd, nevertheless. Figure 3.2 shows the evolution of Brazil's export market share of those three groups of products. It is worth noting that Brazil's share of global exports of agricultural and mineral commodities increased sharply, while its share of manufactured goods exports remained quite stable, with a subtle growth trend in the 1990s. In the period 2000–2013, Brazil's exports of manufactured goods increased 8.8% p.y., overcoming the growth rate of 6.3% p.y. of world exports. Hence, Brazil's market share in total exports of those goods

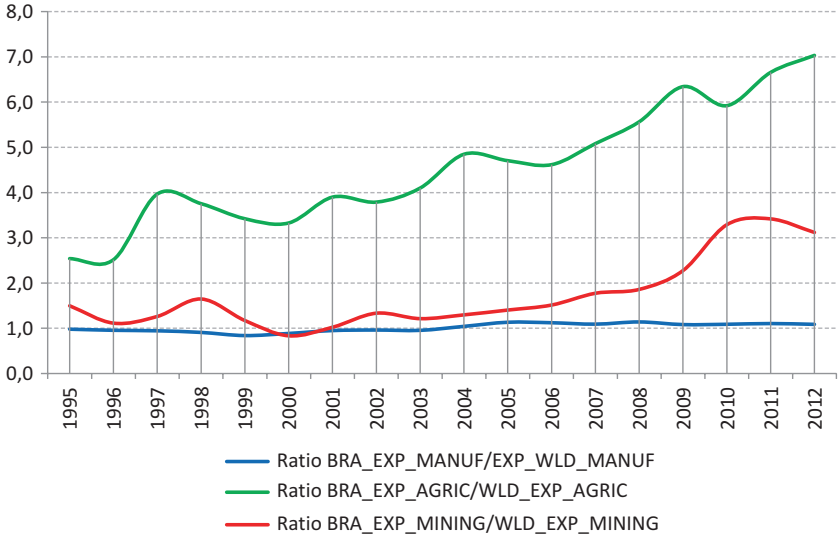

Fig. 3.2 Evolution of Brazil's market share of world exports—1995–2012. (Source: Authors' elaboration based on data from Comtrade—UN)

increased from 0.98% in 1995 to 1.09% in 2012.[11] Indeed, the world economy as a whole seems to be going through a "primarization" phase: the composition of world exports has also been affected by the evolution of relative prices and quantities, which has caused manufactured goods to fall from 91.4% in 1995 to 85.2% in 2012.[12]

The robust increase in the exports of agricultural and mineral commodities has a geographical base. It is not a coincidence that China has become the main destination of Brazilian exports from 2010 on, and that, in 2014, 12.7% of total Brazilian exports were headed to that country. China has become an important trade partner of Brazil's—and not only in terms of exports, as we shall see ahead—especially after the world crisis of 2008. As traditional trade partners lost importance, such as Europe and North America, China grew strong as a partner and pushed the demand for Brazilian agricultural and mineral commodities, while the others demanded less and less. We obtain a good example of primarization having a geographic base by comparing the share of manufactured goods in Brazil's total exports (62%) and the share of total exports exclusively to China (73%) in 2013, noting that in 2000, the share was 83%

and 81%, respectively. That is, the composition of exports to Chinese market[13] significantly contributes to the primarization of Brazil's export.

Exports of manufactured goods have varied significantly across different industries, and one might expect that a decreasing level of sophistication of exports would compensate for the primarization process. But that trend is not observed in industries which are clearly producers of more sophisticated goods, as Fig. 3.3 shows. Brazil's market share in exports of selected industries—chemicals, machinery except electrical, transport equipment, other chemical products and electrical machinery—does not show that decreasing trend in the period. The exports of "other chemicals" are the only ones showing that decreasing trend in the market share in the whole period. In all the other industries, Brazil's exports did not lose market share in world trade throughout the 2000s.

Indeed, traditional and less sophisticated goods were the type of manufactured goods whose exports decreased the most in the period. That is, Brazilian manufacturers of those types of goods were not able to overcome

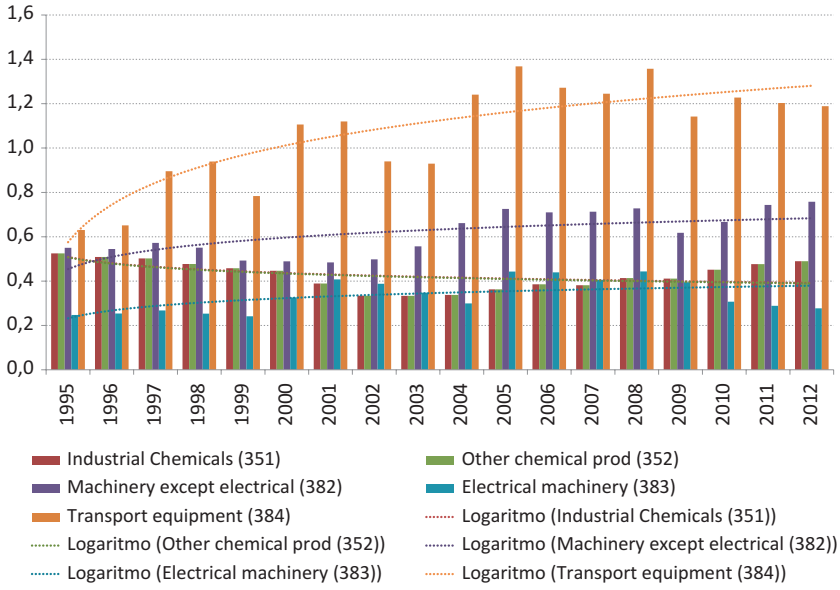

Fig. 3.3 Evolution of Brazil's market share in world exports: Selected industries—1995–2012 (in %). (Source: Authors' elaboration based on data from Comtrade—UN)

Asian competition and lost share in the main international market throughout the 2000s. That was the case of the US and Europe and, more recently, of South American countries.

The integration into global production and trade networks has become increasingly important in order to improve the competitiveness of nations and industries. Such an integration of the Brazilian economy, for instance, is still restricted to the initial stages of input supply chains. According to the distinction made by UNCTAD (2013) between upstream and downstream participation[14] of a country in the GVC, Brazilian participation in value chains is predominantly downstream—as well as other exporters of natural resource-based goods like Australia, Russia, and Saudi Arabia.

A country's competitiveness has been considered more and more a function of a country's integration into GVCs. However, measuring the integration into GVCs poses two methodological challenges for researchers. First, traditional export and import indicators that relate trade flows and GDP mistakenly correlates a gross measure of trade with a value-added one. Second, the increasing share of imported content of exports also makes the traditional measures inadequate for the task.

In face of those challenges, to determine the effective contribution of exports to a given economy, a strategy is to identify not only the imported content of exports, but also the domestic value added of exports.[15] These indicators, which shall be detailed below, seek to disaggregate the gross value of exports into two components by origin (foreign and domestic): the one corresponding to the domestic value added contained in a country's exports—also called the domestic value added of exports (VAX)—and the one corresponding to the value added generated abroad—the foreign value added of exports (VA*X)—see Methodological Box. The latter includes foreign-made inputs employed in the manufacturing of exported goods but excludes domestic-made inputs embodied in those same imported inputs. An accurate measure of that kind of indicator must take into account the different transactions made among the countries and can only be rigorously calculated using world input-output matrices.

The new databases now available, such as the OCDE-WTO TiVA and the WIOD, allow for the investigation of the value added generated by each country's exports, through the identification of the origin and the destination of all intermediate goods and services produced and traded

by a given country and industry. This indicator is particularly relevant since it allows the determination of the part of a country's exports that embodies the value added generated by different countries (Johnson and Noguera 2012; Koopman et al. 2010).

Methodological Box: Domestic and Foreign Value Added of Exports

The domestic value added of a country's exports, considering *n* industries, may be derived as the following (UNCTAD 2013; Soares and Castilho (2016); Yamano and Mirodout 2011; OCDE 2010):

$$\mathrm{VAX} = V^{d}_{1\times n}\left(I_{n\times n} - A_{n\times n}\right)^{-1} X_{n\times 1} = V^{d}_{1\times n}\, L_{n\times n}\, X_{n\times 1} \tag{3.1}$$

Where:

$\boldsymbol{V^{d}_{1\times n}}$ = vector which contains the ratio between domestic value added and gross output for each industry *n*;

$\boldsymbol{I_{n\times n}}$ = Identity matrix;

$\boldsymbol{A_{n\times n}}$ = matrix of domestic technical coefficients;

$\boldsymbol{X_{n\times 1}}$ = vector of exports for each industry *n*;

$\boldsymbol{L_{n\times n}}$ = Leontief inverse matrix which is the total requirement matrix that gives the amount of gross output required for a one-unit increase in final demand;

To better illustrate the model, an example is given using three countries and just one industry, where country *r* plays the role of interested country. Thus, we may write Eq. (3.1) as follows:

$$\begin{pmatrix} \mathrm{VAX}^{r,r} & 0 & 0 \\ \mathrm{VAX}^{2,r} & 0 & 0 \\ \mathrm{VAX}^{3,r} & 0 & 0 \end{pmatrix} = \begin{pmatrix} v^{r} & 0 & 0 \\ 0 & v^{2} & 0 \\ 0 & 0 & v^{3} \end{pmatrix} . \begin{pmatrix} l^{r,r} & l^{r,2} & l^{r,3} \\ l^{2,r} & l^{2,2} & l^{2,3} \\ l^{3,r} & l^{3,2} & l^{3,3} \end{pmatrix} . \begin{pmatrix} x^{r,*} \\ 0 \\ 0 \end{pmatrix} \tag{3.2}$$

In the Leontief matrix, coefficient $l^{r,r}$ indicates when country *r* is in need of domestic-made inputs to produce one unit of a given product, whereas $l^{2,r}$ represents how many inputs are supplied by country 2 to produce one unit of a product. The same reasoning applies to all the other coefficients. The component $x^{r,*}$ includes all exports originating in country *r*.

(*continued*)

(continued)

By definition, the domestic value added of exports plus the foreign value added exported give the total of gross exports. Thus, when focused as a share of exports, VAX can be seen as the domestic content of exports:

$$\mathrm{VAX} + \mathrm{VA^*X} = \sum X_n \tag{3.3}$$

$$\mathrm{DCX} = \frac{\mathrm{VAX}}{\sum X_n} \text{ and } \mathrm{FCX} = \frac{\mathrm{VA^*X}}{\sum X_n} \tag{3.4}$$

Figure 3.4 presents the evolution of Brazilian domestic value added to its exports. It presents a trajectory similar to those of gross exports: a huge growth from 2003 to 2011, except 2009 because of international financial crisis. In all sectors VAX increased but at a different pace. The share of services, mining, and agriculture in total VAX rose to the detriment of a decline in the manufacturing share. The 10 p.p. reduction in manufacturing was compensated by the major gain of mining (5 p.p.) and a significant gain of services (4 p.p.). In fact, it is similar to what has happened to gross exports (when services foreign sales are also considered).

Statistics of total Brazilian exports show a very high level of VAX, corresponding to around 90% of gross exports.[16] However, we do not observe the same pattern in manufacturing industries, where the foreign value added (VA*X) is more important, corresponding to around 50% of gross exports. The VAX showed some fluctuations during the period 1995–2011, but they were not very strong. The only significant variation occurred after the international financial crisis deflagration in 2009, when we observe a 7 p.p. change in VAX and VA*X as a reflex of the rise of the commodities' share in exports in this year.

Table 3.1 presents the industry-specific structure of the VAX and gross exports. The composition of both dimensions is quite different between them, not only in terms of main industries but also in terms of concentration (gross exports are more concentrated than VAX). In 2011, Basic and Fabricated Metals holds the first position in terms of VAX and the industry Food, Beverages, and Tobacco holds the second. Both industries

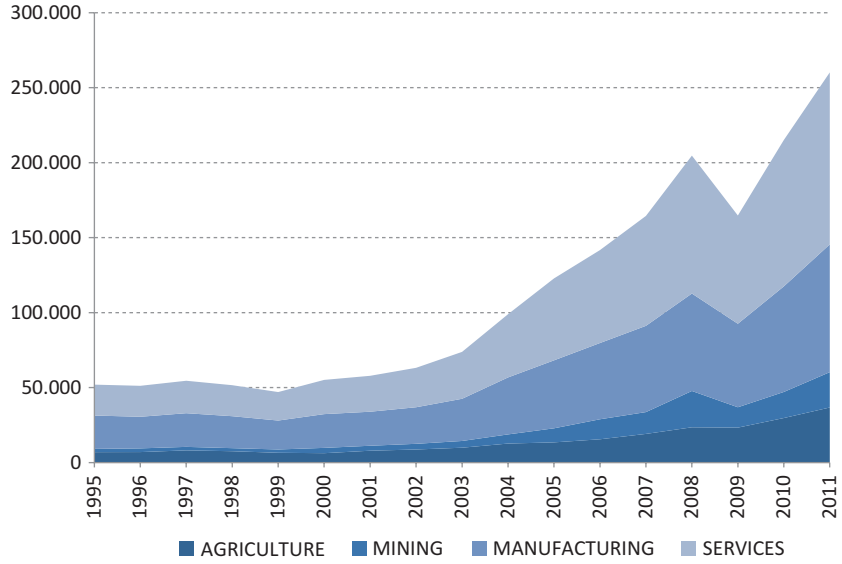

Fig. 3.4 Evolution of Brazil's domestic value added of exports (VAX)—1995 and 2011 (in US$ billions). (Source: Authors' elaboration based on data from WIOD)

Table 3.1 Composition of Brazilian domestic value added of exports (VAX) and gross exports in manufacturing—1995 and 2011 (in %)

	Domestic value added		Gross exports	
Manufacturing industries	1995	2011	1995	2011
Food, Beverages and Tobacco	12.2	14.0	23.6	30.1
Textiles and Textile Products	4.9	3.2	3.3	1.7
Leather and Footwear	2.9	2.1	5.2	2.4
Wood and Products of Wood and Cork	6.3	4.5	2.7	1.6
Pulp, Paper, Printing and Publishing	9.5	9.0	6.8	4.7
Coke, Refined Petroleum and Nuclear Fuel	2.4	6.6	2.2	6.4
Chemicals and Chemical Products	10.8	9.5	8.3	8.3
Rubber and Plastics	7.0	9.0	2.2	2.3
Other Non-metallic Mineral	4.3	4.2	1.8	1.5
Basic Metals and Fabricated Metal	19.8	17.7	19.1	14.1
Machinery, Nec	6.3	5.6	6.7	6.1
Electrical and Optical Equipment	4.3	5.4	5.2	5.7
Transport Equipment	6.6	7.3	11.4	14.2
Manufacturing, Nec; Recycling	2.7	2.1	1.7	1.1
Total	**100.0**	**100.0**	**100.0**	**100.0**

Source: Authors' elaboration based on data from WIOD

together sum up to more than 30% of total domestic value added created in manufacturing. Compared to the structure of gross exports, this value rises to 44.2%. Of all other industries that have some importance to generate value domestically, most are also natural resource-based like pulp and paper, coke and refined petroleum and rubber and plastic.

On the other hand, in relation to the category of technology intensive goods, Transport Equipment seems to have much more relevance to gross exports (14.2% of the total in 2011) than it has to VAX, signaling that that part of the export value in these kind of products cannot be internally appropriated. Traditional industries such as Textiles, Leather and Footwear and Wood products have low contributions for the VAX and their share declined along the period 1995–2011—a movement that reflects the loss of international competitiveness in this kind of chains even in terms of conventional trade statistics.

As already mentioned, the domestic value added is less important for manufacturing than for the other industries in the economy—Mining and Agriculture are intensive in local natural resources, and service is essentially a non-tradable sector. By consequence, the VAX for the economy as a whole is quite high and is frequently taken as an indicator of the closeness of the Brazilian economy. By one perspective, natural resource-based exporters usually present high domestic value added of exports; by the other, in the case of Brazil, the VAX of manufacturing is much lower than other sectors', which means that manufacturing is much more open than one could expect while looking at aggregated data.

As Fig. 3.5 shows, the foreign value added of manufacturing exports tended to increase along the period, especially until the financial crisis outbreak. In 2009, there was an increase of domestic value added as the share of two natural resource industries (Coke and oil as well as Food, Beverages, and Tobacco) raised in total VAX. In terms of gross exports, these industries also gained importance—for Coke and Petroleum, the growth was gradual and constant throughout the decade, but for Food, Beverage, and Tobacco there was a sharp share increase in 2009. That movement is attributed to the changes brought on by the international crisis of 2009, when the demand for manufactured goods was affected negatively, but the demand for food (as well as mineral and agricultural commodities) was kept stable and China gained importance in Brazilian

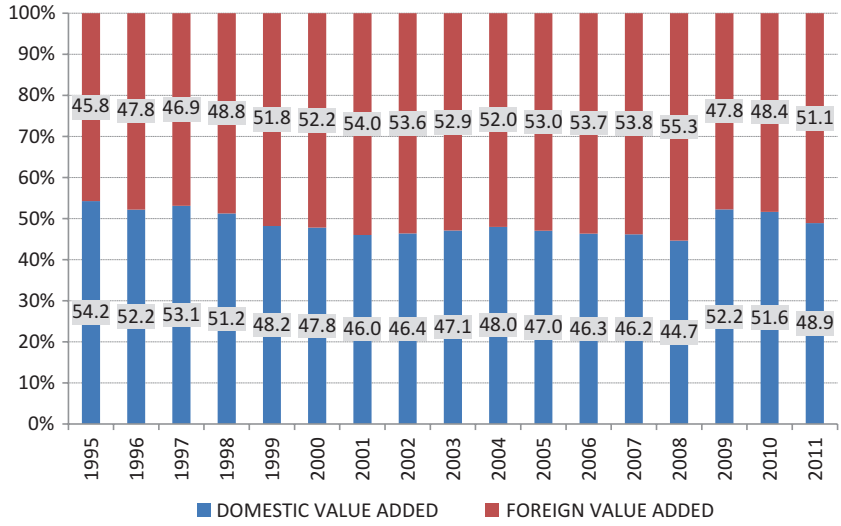

Fig. 3.5 Domestic and foreign value-added share of Brazilian manufacturing exports 1995 and 2011 (in %). (Source: Authors' elaboration based on data from WIOD)

trade compared to other trade partners. Even with the recent reduction of foreign value-added share in total value added, about a half of gross Brazilian manufacturing exports corresponds to foreign value added.

Compared with other countries (Fig. 3.6), Brazilian manufacturing holds an intermediate position in terms of foreign or domestic value-added share of exports. Its indicators are very close to those of Mexico's—which is surprising as the import content of Mexican manufacturing is very high because of *maquiladoras*. Vietnam, Korea, and China show the highest shares of foreign value added, revealing their close engagement in GVC. Australia shows a similar indicator but probably due to its exports of natural resource-based manufactured goods. Examples of countries with higher domestic value added in exports are Japan, Russia, and USA. All of them own relevant domestic markets with a diversified manufacturing structure, which could explain their relative closeness to trade under this measure. Moreover, the USA and mainly Russia export a wide range of natural resource-based manufactured goods. In this scenario, Brazil's profile seems

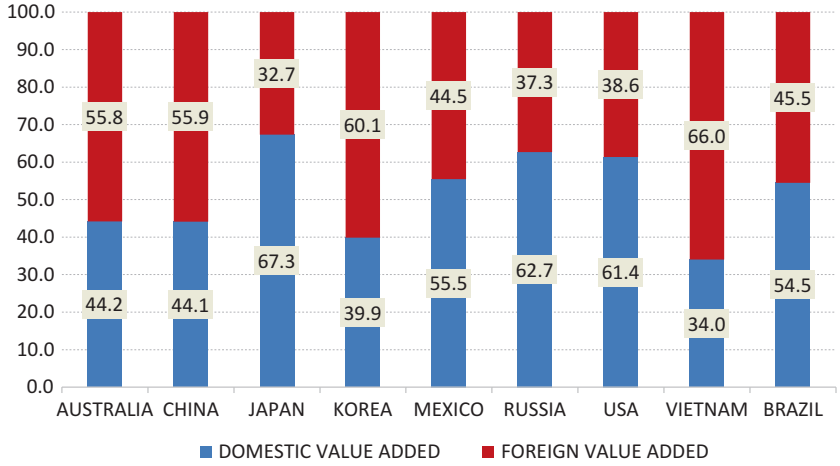

Fig. 3.6 Domestic and Foreign value added of exports in manufacturing for selected countries—2009 (in % of gross exports). (Source: Authors' elaboration based on data from TiVA-OCDE)

to be more similar to those countries. As mentioned before, the domestic market was the main cause behind the industrial growth in Brazil during 2000, and Brazil, as well as the USA and Russia, also exports intensive natural resource-based goods that have low foreign content.

The analysis about the competitiveness of Brazilian manufacturing in external markets had two focuses. One was based on a traditional measure of competitiveness like Brazil's market share in world manufacturing exports. Independently of its low value, its trajectory was quite stable during the last years. The other focus took into account the phenomenon of trade fragmentation. The higher foreign content of exports of a particular country (foreign value added as a share of exports), the greater will be their involvement in global production networks. Brazil has a low share of foreign value added for total exports, but this participation increases a lot for manufacturing products. This means that Brazilian manufacturing is more open than total economy. Is this fact correlated to an increased competition in domestic market and a loss of Brazilian manufacturing goods space in its own market? The next section will pay more attention to those issues.

3.4 The Competitiveness of Brazilian Manufacturing in the Domestic Market

There is a big debate over the effects of economic liberalization and its potential effects on the country's economy—especially, on domestic manufacturing industries. Depending on one's point of view, manufacturing's exposure to international competition due to trade liberalization might be the cause behind the total factor productivity growth and economic growth as foreseen by Edwards (1998) and others. One other hand, it might be reckoned as a strategy producing different types of outcomes depending on the country's economic conditions, its current level of development, and the type of liberalization path followed by the government (Rodriguez and Rodrik 2001).

Regarding Brazil's economy, studies such as Kupfer's (2003) reveals the hardships faced by the country after trade liberalization had been introduced. The author concludes that the trade reforms were not able to improve the competitiveness of Brazilian manufacturing industries, as the composition of exports did not go through significant changes, while the composition of imports surely did. This section provides evidence on the exposure of Brazilian manufacturing to imports since the 2000s.

Figure 3.7 depicts the evolution of manufacturing imports and exports vis-à-vis the evolution of manufacturing production expressed by a fixed base index,[17] taking 2000 as base year. Both the quantum index and the other variable show a growth trend. The output value remained above that of manufacturing exports and imports between 2000 and 2005 and shifted downward after that. Exports grew at a faster pace than imports until the crisis of 2009, when they converged and took the same path. In 2011, that trend reverted, with exports decreasing and imports remaining practically the same at the end of the analyzed period.[18]

From the perspective of the quantum index, that is, with no effects of price fluctuations, in general, and exchange rates, in particular, the analysis shows that imports increased even more significantly in the period, notably when compared to the evolution of domestic physical production. The quantum index of exports increased sharply until 2007, probably driven by the escalation of commodity prices in that period, but it was not able to keep up with the performance of the quantum index of

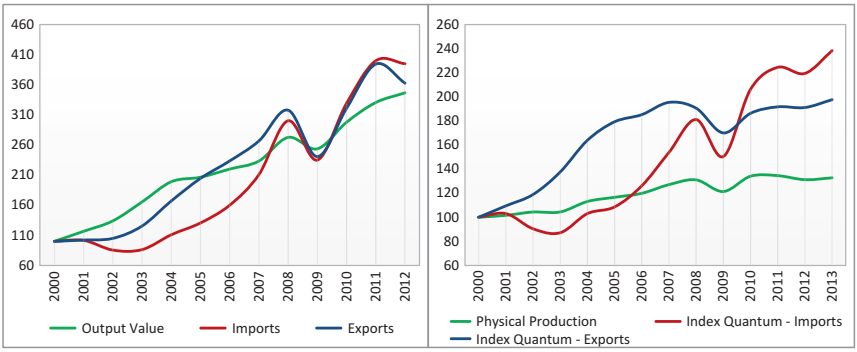

Fig. 3.7 Evolution of manufacturing production, exports, and imports in value and quantum index, 2000–2012. Fixed base index (2000 = 100). (Source: Authors' elaboration based on data from PIA-Empresa/IBGE data (output value), SECEX/MDIC (exports and imports), FUNCEX (quantum index of exports and imports), and PIM/IBGE (physical production, available until 2012))

imports from 2009 on. The latter has been increasing at a rate of 6.4% per year. Physical production increased 33.7% from 2000 to 2012, but it did not follow the pace of import/export data. Such an outcome gives room to a debate on to which extension domestic production is being supplied by imports and how domestic-made and foreign goods compete in the domestic market.

With a view to analyze the competitiveness of Brazilian[19] manufacturing industry in the domestic market, two indicators have been examined. The first one refers to import penetration (IP_i) and relates the quantum index of imports and the apparent consumption of manufacturing industries at constant prices. Apparent consumption combines manufacturing imports and domestic production of manufactured goods of industry *i*, subtracting the exports related to both Domestic and Imported Use of each industry.

$$\mathrm{IP}_i = \frac{\mathrm{Imported\ Use}_i}{\left[\begin{array}{l}\mathrm{Domestic\ Use}_i + \mathrm{Imported\ Use}_i \\ -\left(\mathrm{EXP}_{\mathrm{Domestic\ Use}_i} + \mathrm{EXP}_{\mathrm{Imported\ Use}_i}\right)\end{array}\right]} \tag{3.5}$$

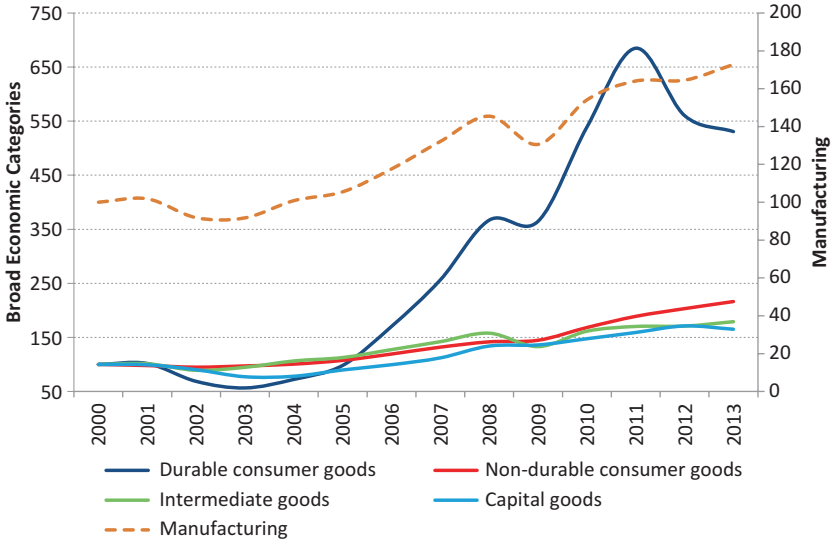

Fig. 3.8 Evolution of import penetration at constant prices for manufacturing and according to broad economic categories. Fixed index base (2000 = 100). (Source: Authors' elaboration based on data from IPEA (apparent consumption) and FUNCEX (quantum index of imports))

Figure 3.8 describes the evolution of the indicator of manufactured goods by broad economic categories and points out very clearly to the growing exposure of Brazilian manufacturing industries to foreign competition. Apart from the periods 2001–2004 and 2008–2009, in all the other years the quantum index of imports increased in the face of domestic supply, leading to an increased share of foreign-made inputs in the Brazilian manufacturing industries. According to data provided by the National Confederation of Industry (in Portuguese, *Confederação Nacional da Indústria*—CNI), import penetration increased from approximately 18% in 2000 to 22% in 2014. The analysis of import penetration by broad economic categories suggests that imports affected each category differently. All of them showed increased import penetration, but the import ratio in durable goods showed a cumulative growth of over 500% between 2000 and 2013.

The second indicator under examination refers to import content (IC_{ij}) of output, and it captures the share of imported inputs in overall

domestic industry demand. It is a different way to look at the foreign competition in the domestic market. In general, indicators of import content are calculated based on input-output matrices. In the case of Brazilian industries, the only input-output matrices[20] available at this point refer to years 2000 and 2005. With a view to update the input-output matrix to include other years, a methodology[21] has been developed based on tables of resources and uses provided by the Brazilian Institute of Geography and Statistics (in Portuguese, *Instituto Brasileiro de Geografia e Estatística*—IBGE). The share of import content[22] of component *j* demanded by industry *i* will be estimated as the following:

$$IC_{ij} = \frac{\text{Imported Use}_{ij}}{\left[\left(\text{Domestic Use}_{ij} + \text{Imported Use}_{ij}\right)\right]} \tag{3.6}$$

Figure 3.9 reveals the import content[23] at constant prices in 2000 of Brazil's economy, in general, and domestic-made goods, in particular, according to the intermediate demand and two components of final demand: consumption[24] and investment. Regardless of the perspective, the share of imported inputs in domestic-made products increased. As import content data peaked in 2008 but got interrupted in 2009, its behavior in the following years is unknown; however, as seen in the previous charts, it is believed to have kept the growth trend even after the 2009 decrease due to the effects of the international crisis.

From the point of view of imported intermediate goods, about 24% of all tradable goods used as inputs in Brazilian manufacturing industries in 2008 are believed to be imported. That share decreases to 13.5% when the focus is on the overall Brazilian economy. As for the cumulative growth rate of import content, it is estimated that import content of domestic-made goods increased over 50% between 2000 and 2008. Despite their share of expenditures in imported intermediate goods being smaller (10.6% in 2008), government consumption and family consumption also increased significantly in the period. Among the examined variables, investment shows the highest relative share of imported goods in relation to the total demand of domestic firms. Approximately 34% of all capital goods purchased by Brazilian firms are imported, and the share of imported capital goods increased by 14% in the decade under study.

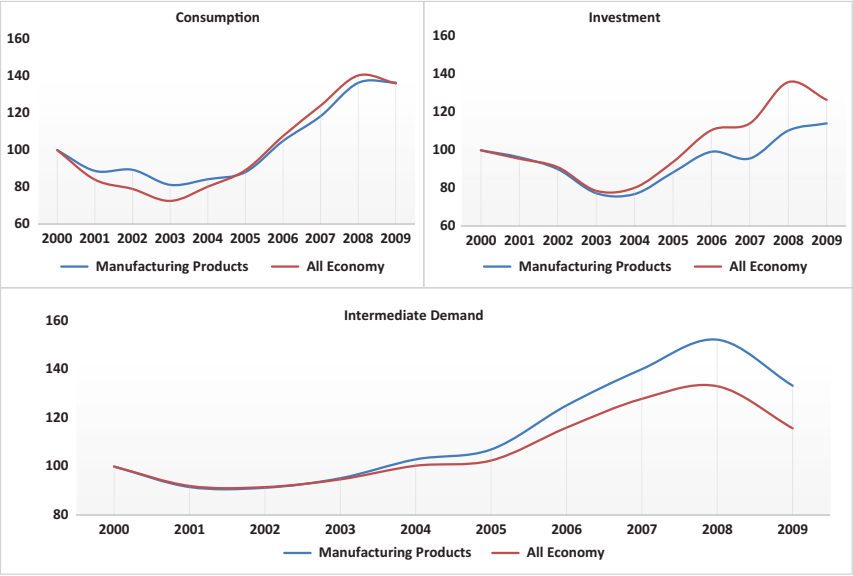

Fig. 3.9 Evolution of import content by components of final demand at constant prices—2000–2009. Fixed base index (2000 = 100). (Source: Authors' elaboration based on input-output matrices based on National Accounts data provided by IBGE)

As we saw in the third section, foreign value-added answers for an important share of gross Brazilian manufacturing exports value. In national market, foreign goods are not only relevant, but their presence has grown significantly in the past years as imports penetration and import content of domestic production indexes show. This evolution may have consequences to the Brazilian productive structure.

3.5 Concluding Remarks

The aim of this chapter was to examine the competitiveness of Brazilian manufacturing from the perspective of productive fragmentation. Holding that perspective allows for a different view of competitiveness that prioritizes the activities, tasks, and all the value created in this process over the transactions of final goods, which is the focus of traditional

trade statistics usually treated in conventional literature. For countries like Brazil, the fragmentation of production is important for some reasons. There has always been an attempt to access higher value-added chains to improve the external insertion of the country and expand internal sources of better quality employment and sustainable growth income.

The competitiveness of Brazilian manufacturing can be analyzed from two perspectives: one based on the international context and another focused on the domestic dimension. The first one took into account the pattern of Brazilian exports and their composition in comparison to world results, and it sought to understand how that type of export basket relates to the evolution of domestic and foreign value added of exports. Brazilian exports are intensive in natural resources and are increasingly geared to this kind of trade specialization. However, this seems to be a generalized movement, since Brazil's market share in world manufacturing exports has remained stable.

As Brazil's export structure is concentrated in mineral and agricultural goods it makes the country's chances of integrating into GVCs reduced; almost 90% of its exports are due to domestic value added. Nevertheless, in the universe of manufacturing goods, this rate is 50% in average. That means that only half of manufacturing production value added is domestically generated.

The second perspective is clearly associated with the former one. In the domestic market, the competitiveness of Brazilian goods is threatened by the rise of imports penetration in overall manufacturing, especially after the world financial crisis of 2009. The same fact is observed when looked at from the point of view of the import content of everything demanded by Brazilian agents. The import content has increased in all components of demand.

Indeed, the international financial crisis seems to have induced important changes into Brazilian manufacturing competitiveness both in the international and the domestic arena. Globally, despite the stability of its international market share, goods manufactured from natural resources have gained importance. This can explain the recent rise of domestic value added of exports. On the domestic side, the growth of import penetration showed an acceleration trend, mainly in the case of durable goods.

Notes

1. Industrial production except oil was multiplied almost by 3 between 2000 and 2012 in nominal terms (according to our estimations). During this period, there was a negative growth rate only in 2009.
2. Kaplinsky and Morris (2002) suggest that the organizational changes promoted by the Japanese auto industry in the 1950s are in the origin of the process of international fragmentation of production.
3. In Jones and Kierzkowski (1990), the costs deriving from the physical separation of production stages are called service link costs and include costs of transportation, trade barriers, and various types of coordination.
4. According to Orefice and Rocha (2011), regional and multilateral investment agreements have grown significantly since the 2000s.
5. That view corresponds to the "global value chains"(GVCs) approach proposed by Gereffi and Fernandez-Stark (2011), among others. There are conceptual differences between the terms whose analysis, however, is beyond the scope of the present chapter; we have decided to employ the expression "international trading and production networks", as employed by Milberg and Winkler (2011). The view of international trade from the perspective of production stages and activities is known in the literature as trade-in-tasks (for a comprehensive, updated literature on the subject, see Helpman 2011).
6. US and China trade data presented in value added (WTO).
7. Check Hummels et al. (2001, p. 80).
8. For example, some sub-products of soybean or coffee—such as "soybean oil cake or solid residues resulting from extraction of soybean oil"—are considered as a manufactured good in some classifications despite their low degree of processing.
9. See Castilho (2011).
10. For more details, visit UNCTAD website.
11. The average growth rate of exports of agricultural and mineral commodities was 18% p.y., and their market share in the international market reached 3.3% and 11.2% in 2012, respectively.
12. Other factors might contribute to the observed drop in world exports of manufacturing goods like the low growth in unit labor cost in dollars for those primary products due to the Asiatic competition, mainly China.
13. In 2013, 72% of Brazil's exports to China were basically composed of two products: soybeans and iron ore (37% and 35%, respectively). The exports to China of those two products alone accounted for 13.7% of total Brazilian exports in 2013.

14. According to UNCTAD (2013), the upstream participation corresponds to the foreign value-added share of the country's exports, while the downstream participation corresponds to the "exports that are incorporated in other products and re-exported" (p. 10). Most natural resource-based countries have an important upstream component. But note that countries, like Korea and China, that intensively export intermediate goods have also an important upstream component.
15. The many international agencies, leaded by WTO, have been trying to estimate the value added of exports. One of the reasons for that question has a macroeconomic motivation and seeks to minimize the growing trade deficit of the US and other developing countries with China. For example, according to estimates by Johnson and Noguera (2012), US-China trade deficit could have been 30–40% smaller if measured by value added.
16. From 2004 to 2010, according to our estimations based on WIOD data, the VAX corresponded to more than 90%. In 2011, it declined to 88%.
17. Import and export indicator is based on data sets expressed in US dollars provided by Foreign Trade Secretariat—Ministry of Development, Industry and Foreign Trade (SECEX/MDIC), while output value series are expressed in Brazilian Reais provided by IBGE/PIA-Empresa.
18. The accumulated growth rates of imports in years 2000 and 2012 are 295%, and 262.7%, respectively. Output value also increased (246.6%), but not as vigorously as the other focused variables.
19. In a recent study, Soares and Castilho (2016) analyzed the impact of Chinese competition in the Brazilian domestic economy using input-output analysis. Results suggest that five domestic industries have been mostly affected by the competition with China: Leather and Footwear, Rubber and Plastic, Other Manufacturing goods, Textiles and Clothing and Electrical Machinery and Optical Equipment.
20. The WIOD database provides a series of input-output matrices in the years 1995–2011. However, data sets are at current prices. Since input-output data at constant prices was needed to perform this analysis, the input-output matrices compiled by IBGE were preferred over WIOD's.
21. For more details on that methodology, see Neves (2013).
22. It is worth to mention that the import content of output referred to in this study is the direct import content. The indicator is not able to capture the indirect import content of output, that is, the share of imported content embodied in inputs purchased from domestic suppliers. The

effect of indirect import content of output can be estimated based on a Leontief matrix.

23. The import content series goes until 2009, which was the latest year available for the Resources and Used Table provided by IBGE at the time of the elaboration of this article.
24. The term consumption is understood as the sum of general government consumption and household consumption, which includes consumption by non-profit organizations.

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4

Restructuring and Economic Performance of Large Industrial National Brazilian Groups in the Post-Privatization Period

Celio Hiratuka and Marco Antonio Rocha

4.1 Introduction

Despite the poor results of the Brazilian industry in recent decades, when we observe the performance of the major economic groups, the result seems rather different. In the same period, the major economic groups in Brazil have diversified and internationalized their activities, reduced their financial exposure, and changed their forms of relationship with the government—especially in the case of public concessions and their relationships with State-owned companies—and they still maintained a rapid pace of earnings growth, with the important exception of the years of the Crisis.

In the analysis proposed in this chapter, the evolution of the trajectory of the Brazilian industry and the trajectory of the major economic groups is understood as the result of a long, and not always planned, process of

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reorganization of the structure of large Brazilian companies and its relations with the government. This movement is associated mainly with the improvement of the financial situation of the major economic groups made possible by the process of privatization and subsequently by the more organic association between the Brazilian "Big Capital" and some Brazilian financial funds created and institutionalized during the heavy industrialization process (Rocha 2013). These transformations have resulted in a growing share entanglement between traditional economic groups, State-owned companies, and financial capital, specially pension funds and investment funds from public banks.

The reformulation of ownership structures linked to infrastructure projects and other forms of public investment, in turn, enabled the rapid occupation of new investment frontiers opened by the privatization and by the changes in the form of provision of public utilities. There was a growing participation of the major Brazilian groups in these activities not only within national boundaries but also in the South American and African continents, taking advantage of the expansion of the privatization process in other countries. To show the characteristics of this process, we selected a panel of 20 diversified major economic groups with national capital,[1] and we analyzed the evolution of the data related to economic performance, with special attention to the ownership of restructuring processes, the evolution of financial indicators, and the trajectories of diversification and internationalization practiced by these groups.

The central axis of this process begins around the assets privatized during the 1990s and, although we cannot detail in this chapter the restructuring process of the industries that were privatized,[2] the results consolidated after more than a decade and a half demonstrate an ownership pattern marked by the association between State-owned companies, economic groups, and pension funds, which gave the tone of the ownership structure that characterizes the large companies in the following decade. Therefore, it is also believed that, in many cases, the growth of the economic groups was much less due the evolution of the attributes related to the industrial competitiveness and more a process of seizing profit opportunities from the reformulation of the division of labor between public institutions and large companies sponsored by a set of policies and the mobilization of specific financial funds—mostly the pension and State funds.

In the 2000s, the growth of economic groups was characterized by the recovery of public-private associations and capitalization processes often involving the equity market but mostly mobilizing State and pension funds. In this case, the economic groups were benefited by the growth of large State-owned companies and public financial institutions. This chapter presents an analysis of this process, focused on the recent trajectory of the major economic groups and on the changes in their ownership structure. In the final remarks, we make some comments on the process and its effects on the management of the economic policy and the public investments in Brazil.

Obviously, it is necessary to make some comments about the political crisis after 2014. After the huge street demonstrations that happened in 2013 ("Jornadas de Julho de 2013"), which had been followed by a series of corruption scandals centered around Petrobrás and a set of business groups, the Brazilian economy was pushed into a political turmoil associated with the worst economic crisis in recent Brazilian history. As the present scenario is characterized by a profound uncertainty, the analysis last until 2013, the ongoing crisis makes any possible prognostic a mere exercise of wishful thinking.

4.2 Privatization, Pension Funds, and Restructuring of the Brazilian Economic Groups

The privatization represents a much broader change in world capitalism than the simple change in how State-owned companies are managed. The process could be seen as a huge insertion in the financial circuit of not only many of the State-owned companies from the capitalist center and periphery but also coincided with the transformation of the economies of the Soviet bloc, with their proper assimilation of the same process. It also represented, worldwide, a process of reorganization of the capitalism in its systemic level, with the insertion of a large mass of assets on the global financial circuits and, considering the constant findings of asset underpricing, it provides the capitalization of several investment funds through the financial revaluation of these assets.

The argument put forward here is that in the Brazilian privatization process during the 1990s, the benefits of the transference of State-owned assets remains in the control of the Brazilian Business Groups. The large Brazilian capital took advantage of the improvement of the financial conditions during the 1980s (Belluzzo and Almeida 2002) to actively participate in auctions, delineating well-defined strategies and consolidating its hegemonic position in relation to a significant part of the Brazilian industry.[3]

A brief survey on the national capital movement after the privatization demonstrates how the concentration process that followed it reinforced the role of the national capital in most of the privatized industries, as seen in Chart 4.1. First, the corporate restructuring was part of a broad movement to increase the capitalization of the companies listed on BM&FBOVESPA (the São Paulo stock market), which, in parallel, also enabled the growth of the financial funds triggered during the process, such as BNDESPar[4] and several pension funds, which could expand their investments in affiliated companies, becoming an important partner of national private groups. As their foreign counterparts, the national investment funds became key elements in the local capital market and their dynamics were strongly tied to the movement started during the privatization.

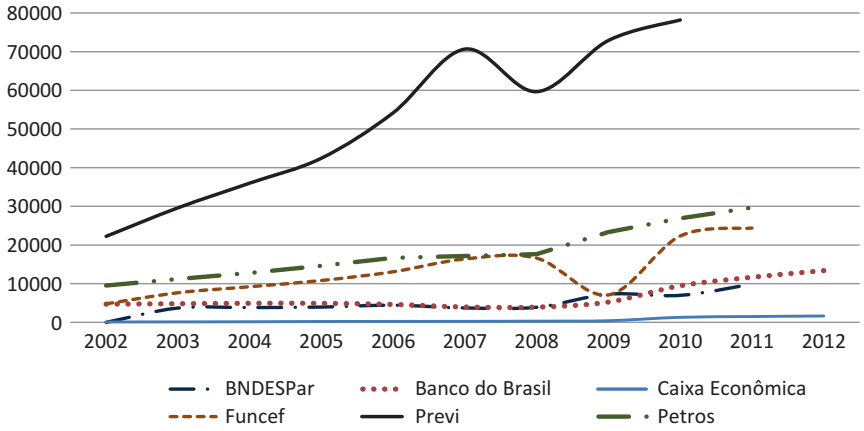

Chart 4.1 Evolution of investments in noncurrent assets of the main public and private closely held complementary pension funds in US$ million (All values were calculated in 2012 average exchange rate.) (2002–2012). (Source: From the companies themselves)

Second, the growth of these players allowed the consolidation of more concentrated ownership structures in privatized sectors, providing financial support to the process of centralization of the command on the privatized assets. This was the basis for the next process of diversification of a series of major Brazilian business groups, which formed some important control structures over the Brazilian industry, characterized by the association between the large private national capital, the State, and union financial funds.

The rearrangement of ownership structures after privatization creates a well-established pattern of shareholder composition in mostly industries that was previously controlled by the Brazilian State. In the electricity sector, mining, and railways, for example, the partnerships between pension funds, business groups, and State-owned companies had built networks of control over several companies. The following figures show in an abbreviated form these networks. In the electricity sector, this process results at least in three big holding companies (represented by the yellow boxes) controlled by the pattern of shareholder described, with the major shareholders represented by the pink boxes (Fig. 4.1).

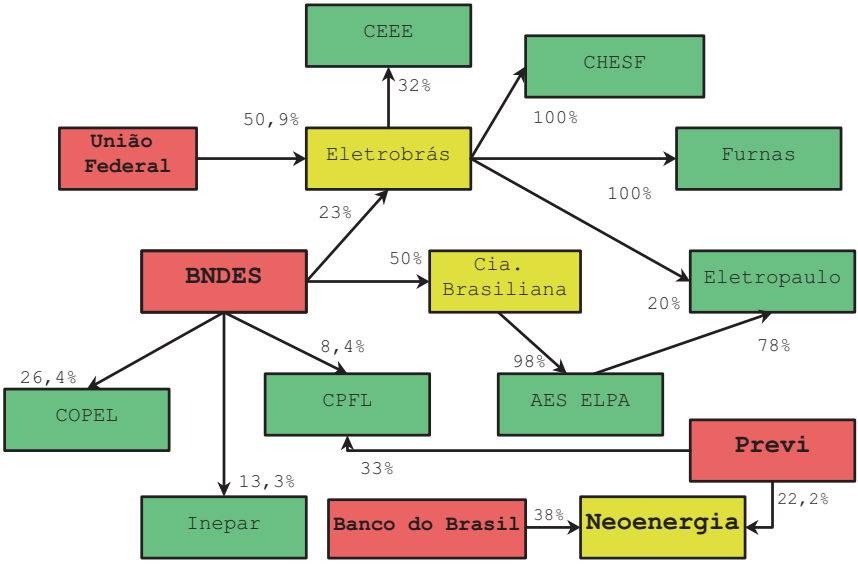

Fig. 4.1 Abbreviated ownership structure of Brazilian Electricity Sector (2012). (Source: From the companies themselves)

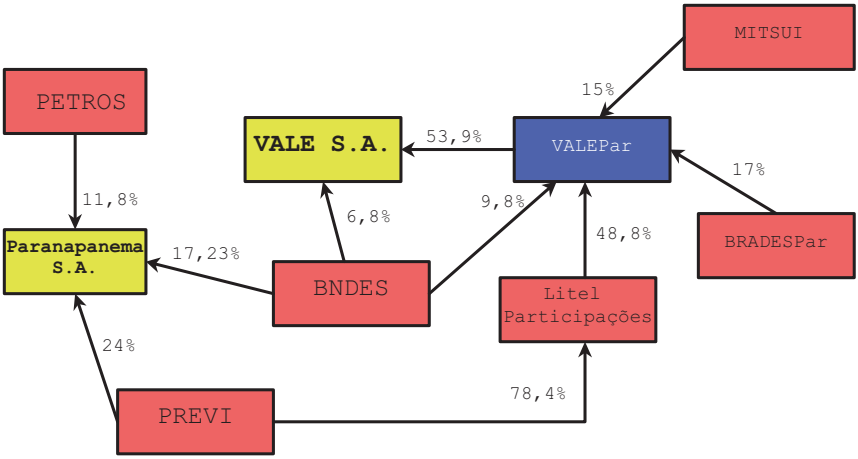

Fig. 4.2 Abbreviated ownership structure of Brazilian Mining Industry (2012). (Source: From the companies themselves)

In the mining industry, we can see a similar pattern, with two holding companies that have been formed around the State-owned assets. The results of the process was basically the formation of five large systems of companies: MMX/Anglo American, a group of joint ventures controlled by a Brazilian company (MMX) and Anglo American; the Votorantim mining industries, a traditional Brazilian economic group that own some mining companies; Vale, the major mining company, controlled by Valepar Holding Company; and Paranapanema, controlled by pension funds and the State-owned development bank equity fund BNDESPar (Fig. 4.2).

The rearrangement of the Brazilian railway system had followed the same pattern, especially because of the process of vertical integration of some business groups in logistic services, which was common in the case of basic industries and agribusiness. The process resulted in two holding companies that unify the shares of some big business groups in Brazilian railway system; additionally, the mining and steel economic groups control a set of assets in railway system through their own logistic companies (Fig. 4.3).

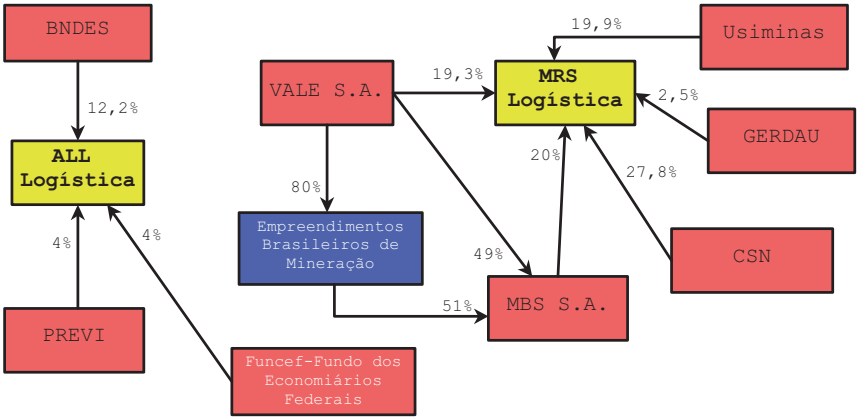

Fig. 4.3 Abbreviated ownership structure of Brazilian Railway System (2012). (Source: From the companies themselves)

In others industrial sectors—like petrochemicals, fertilizers, and steel—the process had shown many similarities, with State-owned institutions and union pension funds participating actively in the ownership restructuring. The privatization had inaugurated a new model of big business organization in Brazil, based in stock holding companies and composed by partnership between national financial funds, State-owned institutions, and economic groups. Because of the specialization of Brazilian economic groups in natural resource activities, these funds have been significantly benefitted by the commodities price cycle, increasing in volume and expanding their activities. The high yield of Brazilian treasury bonds was also another source of growth for the pension funds during the 2000s, contributing to create some large financial funds for Latin American standards.

We can see from Chart 4.2 the volume and concentration of the assets controlled by the pension funds, with clear leadership of the funds established by the public sector: Previ, sponsored by Banco do Brazil; Petros, sponsored by Petrobrás; Funcef, sponsored by Caixa Economica Federal; Real Grandeza, sponsored by Furnas and Eletronuclear; and Forluz, sponsored by Cemig. In these funds, roughly speaking, the board of directors is composed of members appointed by State-owned companies and unions. In addition to these, Valia represents an interesting case, in

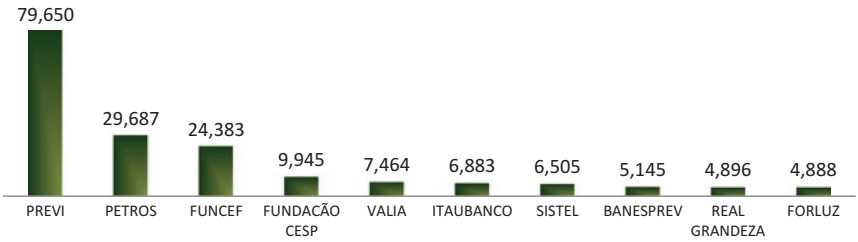

Chart 4.2 Main closely held complementary pension companies by volume of investments in US$ million (2011). (Source: Brazilian National Association of Pension Funds (ABRAPP) (2011))

which the fund is controlled by Vale, which in turn is controlled by Previ. The Sistel and Fundação Cesp are sponsored by companies in the telecommunications and electricity sectors, respectively. The Fundação Itaubanco and Banesprev are sponsored by a number of banking companies, which control these funds through appointment or right of veto. However, in all of them, the unions push for a greater participation in the board of directors, as we have already pointed out.

From the privatization process, the pension funds began to participate actively in the reorganization of the privatized sectors and to adopt strategies of active participation in the ownership structures of several Brazilian companies. In many cases, the pension funds became the real controlling shareholders of major business groups, such as BR Foods, CPFL, and Vale, as well as important partners in the capitalization of growth strategies of private capital. Thus, the funds as well as familiar business groups, accumulated a significant proportion of the equity gains resulting from the privatization, which enabled their growth, following the increase of the financial volume capitalized by the São Paulo stock exchange (BM&FBOVESPA).

Subsequently, the consolidation of these associations received a strong contribution from the movement of subscription of shares and bonds by BNDESPar. In less than a decade, the value of the BNDESPar assets in equities and securities went from just under US$ 3 billion, in 2003, to almost US$ 55 billion, in 2010. In addition, BNDES had a significant increase of its shareholder funds through a process of capitalization carried out by the Brazilian National Treasure, whose total value of transfers increased from approximately US$ 7 billion, in 2003, to approximately

US$ 160 billion, in 2012. The volume of resources enabled the BNDES to actively act in the financing of the conglomeration process of some major Brazilian business groups.

Overall, the growth of the volume capitalized by these financial funds in Brazil and their role in the restructuring of the Brazilian "Big Capital" enabled the business groups to take advantage of a set of investment opportunities created by the transfer of activities from the State to the private sector—first by the privatization and later by the public concession after 2000—and, in other cases, helped to expand the productive scale during the commodity cycle. This was typically the case of large construction firms, marked by the seizing of the opportunities opened up by the public concessions and by the large infrastructure projects. In this case, similarly to the privatization, the growth of the major Brazilian business groups was linked to new investment frontiers opened by the transformation of the relations between the private and public sectors, started in the 1990s. In the next section, we will synthetically introduce the results of these modifications in the performance of the business groups in the last decade.

4.3 Recent Evolution of the Major Brazilian Economic Groups

The privatization provided the local capital with one of the main spaces of capital accumulation during the 1990s by associating the underpricing of assets, the possibility of the use of "privatization currencies,"[5] and the increase in the international supply of credit. These factors attracted almost all the major business groups in Brazil to strategies aimed at the acquisition of State-owned assets. In parallel, the growth of the price and markets of mineral and agricultural commodities during the period allowed the increase in profitability of some groups, encouraging processes of diversification and internationalization of the business groups linked to the agribusiness and extractive industry. Both movements allowed the consolidation in the last decade of a set of Brazilian business groups that commands the economy along with the multinational capital and some business groups of mixed capital (national and foreign).

The evolution of the participation of these Brazilian groups in the economy, although remaining at a stable level, showed a slight uptrend, affected only by the crisis of 2009. On average, the combined gross revenues of the selected economic groups account for approximately a quarter of the gross domestic product, despite having reached approximately one-third the year before the crisis. Despite the comparison between different measures—revenue and added value—the comparison with the GDP allows us to have an insight about the volume of resources mobilized by the large business groups compared with the volume of total wealth produced.

The uneven economic performance between groups demonstrates how the economic growth of the last decade focused mainly on a small set of Brazilian conglomerates, which increased well above the other groups. Table 4.1 summarizes the set of Brazilian Economic Groups which comprises the analysis, ranked by the value of the net equity and the gross revenue. For two of these groups, JBS and Cosan, it is precisely the growth in this last decade that puts them among the 20 major Brazilian economic groups.

Table 4.1 Economic groups selected by net equity and gross revenue (2011)

Economic groups	Net equity (US$ in millions)	Gross revenue (US$ in millions)
Petrobrás	170.022,5	156.721,6
Vale	75.072,2	54.002,0
Eletrobrás	39.509,9	16.919,9
Itaúsa	36.513,5	71.599,9
Bradesco	33.883,8	80.731,6
Votorantim	18.228,8	19.922,7
Gerdau	13.572,1	20.378,7
Telemar (Oi)	11.246,4	22.450,3
JBS-Friboi	11.053,8	32.875,5
Usiminas	9.730,9	8.241,8
Odebrecht	9.204,8	36.340,4
Sadia (BRFoods)	7.221,0	15.025,9
Copel	6.176,8	6.095,9
Cemig	6.010,7	11.673,8
Camargo Corrêa	5.278,1	10.380,8
Cosan	4.921,4	9.655,1
CPFL Energia	4.376,9	5.045,1
CSN	4.307,7	10.124,7
Andrade Gutierrez	4.044,6	13.264,0
Embraer	2.993,0	8.327,8

Source: Magazine Valor Grandes Grupos

The analysis of the data related to the evolution of the shareholders' wealth and the revenue of the business groups allows us to better organize certain growth patterns of the major Brazilian business groups. Observing the performance of the fastest growing business groups, we can highlight those whose main activity is related to the mineral and agricultural commodities. In the same period, the price indices for the same commodities grew approximately 300% and 155%, respectively, which favored the accelerated expansion of groups linked to these activities. There is also a set of economic groups of intermediate growth—between 600% and 100% of asset growth during the period—which contains large construction firms, banking conglomerates, traditional groups—such as Gerdau and Votorantim—and some public utility companies. Finally, there is a set of economic groups in the sample with growth below 100% during the period, formed by CSN, Embraer, and Eletrobrás.

Of the sample of the selected groups, virtually, all of them grew above 100% during the period, and the years from 2004 to 2008 saw a particularly accelerated expansion of the major business groups in Brazil. Although the crisis of 2009 reduced the growth rate of the groups, the growth recovery for some of the economic groups occurred quickly—although a slight worsening in the debt indicators generally happened. Table 4.2 shows the average performance of the selected Brazilian economic groups. In some specific cases, the financial losses also resulted in the sale of assets and the reduction of the diversification plans of some major groups.

To facilitate the presentation of the data related to the trajectory and performance of the major business groups, the panel was divided into seven categories: economic groups of basic inputs, large construction firms, electricity industry groups, mineral extraction, food processing and agribusiness, big banks, and technology intensive, according to Table 4.3. We can also observe from the table the industry concentration of the Brazilian "Big Capital" around a few industries. However, in some cases, they rely on global-sized companies with a high degree of internationalization.

Some of these business groups adopted significant diversification strategies through the acquisition of companies and formation of joint ventures, which was the case of large construction firms and agribusiness companies. In other cases, such as in basic inputs and the extractive

Table 4.2 Profitability and earnings growth of the selected groups (2003–2011)

Economic groups	Average profitability (ROA)	Growth of the net income in the period
Petrobrás	23.4	334.5%
Vale	26.1	1371.9%
Eletrobrás	2.2	132.0%
Bradesco	20.9	494.4%
Votorantim	17.2	120.7%
Itaúsa	21.9	72.9%
Gerdau	22.6	199.3%
Telemar (Oi)	7.0	722.5%
Usiminas	22.5	21.2%
JBS-Friboi	15.7	–266.1%
Odebrecht	11.1	118.8%
Sadia (BRFoods)	16.7	243.5%
Cemig	15.2	88.5%
Copel	8.8	490.5%
Camargo Corrêa	11.1	124.5%
CSN	32.5	144.1%
Andrade Gutierrez	4.0	1539.3%
Cosan	5.9	1831.8%
CPFL Energia	19.3	459.3%
Embraer	17.0	–51.4%
200 major economic groups (national and foreign)	14.6	501.8%

Source: Magazine Valor Grandes Grupos

industry, a high degree of vertical integration of activities was facilitated. In the case of the financial sector, banks kept their small presence in the industrial activity, either through shareholdings or through affiliated companies, even with their importance as minority shareholders of some big companies. These points are addressed with further details from the trajectory of the economic groups that comprise each category.

4.3.1 Economic Groups of Basic Inputs

The major economic groups with main activity in the sectors of basic inputs present on the panel—Votorantim, Gerdau, Usiminas, and CSN—showed a heterogeneous evolution. While Gerdau, Votorantim,

Table 4.3 Summary table of the selected economic groups

Category	Economic groups	Major operating segments	Trajectories of diversification	Internationalization
Basic inputs	Votorantim; Gerdau; Usiminas; CSN	Steel, construction material, pulp, and paper	Mining, rail transportation, and agribusiness	Low, with the exception of the Gerdau group
Electricity sector	Eletrobrás; CPFL; Cemig; Copel	Electricity sector (generation, transmission, and distribution)	Little diversified	Low
Large construction firms	Odebrecht; Camargo Correa; Andrade Gutierrez	Construction, real estate, and public concessions	Mining, oil and gas, shipbuilding, and defense industries	High, mainly in Latin America and Africa
Mineral extraction	Petrobrás; Vale	Iron, oil and gas, and fuel distribution	Fertilizer, metallurgy, and petrochemistry	High, typically resource seeking
Food and Agribusiness	JBS; BRFoods; Cosan	Food processing, bioenergy	Cleaning products, cosmetics, finance, pulp, and paper	High
Big Banks	Itausa; Bradesco	Diversified financial services	Building material, basic inputs, and energy	Low
Technology intensive	Embraer; Oi S.A.	Telecommunications and aerospace industry	Little diversified	Low, except for Embraer

Source: From the companies themselves

and Usiminas showed a strong asset growth associated with the addition of their revenue, CSN was one of the groups in the sample with lower growth in its net equity. Table 4.4 shows the performance of the major Brazilian economic groups of basic inputs during the period 2002–2011. In this group, Gerdau represents a characteristic case of growth from a strategy of acquisition of State assets during privatization.

The Votorantim group maintained over time the rank of largest Brazilian industrial group of private origin, despite the considerable reduction of the difference between Votorantim S.A. and the other groups in the panel. Although it has expanded its presence in various branches, most of the group's business areas were already established since the early 1980s. From the juncture of the 1990s, Votorantim S.A. reduced its business areas and sought to centralize its assets in fewer companies, ending, for example, its activities in heavy equipment and capital goods. Analogously, the effects of the crisis of 2009 on the degree of indebtedness of the group forced Votorantim to dispose of some shareholdings, mainly in finance and biotechnology. In 2011, the Group also fully sold the Nitro Química S.A., virtually ending its activities in the chemical industry.

Also after the crisis, the BNDES, when it took approximately 30% of the shares of Fibria Celulose S.A., allowed the VCP—former pulp and paper company of the Votorantim Group—to incorporate Aracruz Celulose, creating the new company from the merger of assets in 2009. The company took advantage of the effects of the crisis on the Aracruz Celulose to incorporate the company's assets and to form Fibria, the world's biggest producer of pulp, which has since been concentrating the shareholdings of the Votorantim Group in pulp and paper. In the steel industry, although the Group has failed to ensure a relevant participation in the large systems formed from the privatization—CSN and Usiminas—Votorantim Siderurgia acquired businesses in Argentina and Colombia, as well as their mills already installed in Brazil. The effects of the crisis on Votorantim meant a reorganization of its business areas; in addition to the loss of part of the control over the Banco Votorantim, it also sold the biotechnology companies of sugarcane—Canavialis and Alellyx to Monsanto—for approximately US$ 290 million. Both companies were formed through the venture capital funds of Votorantim and held a significant patent portfolio in the industry.

Table 4.4 Performance of economic groups of basic supplies 2002–2011 (base year 2002 = 100)

Economic group		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Votorantim	Net equity	100	128.9	159.6	177.8	206.9	229.3	227.0	231.4	305.7	317.6
	Gross revenue	100	141.6	183.3	192.6	296.1	310.5	353.5	290.0	296.4	566.6
Gerdau	Net equity	100	113.5	180.7	250.7	315.3	503.0	604.0	538.8	486.6	636.0
	Gross revenue	100	145.8	219.7	243.5	269.3	330.4	399.6	256.9	340.1	412.5
Usiminas	Net equity	100	135.7	205.9	301.5	367.7	434.6	514.7	538.4	648.0	643.9
	Gross revenue	100	136.1	199.2	216.4	212.7	237.6	268.1	190.6	218.2	357.0
CSN	Net equity	100	156.0	142.2	140.8	136.5	166.0	146.5	123.3	169.8	181.7
	Gross revenue	100	139.8	209.7	214.1	201.2	254.4	310.8	248.2	303.9	288.1

Source: Magazine Valor Grandes Grupos

The Gerdau S.A., after the period of purchase of assets during privatization, experienced a period of great profitability throughout the 2000s. The profitability of the group was strongly affected by the international crisis, mainly because of its high degree of internationalization. In addition to the revenue from its affiliates in foreign markets, the profitability was also affected by the business focusing on the domestic market of steel for construction, whose demand depends, above all, on the rise of investments in construction, which also fell short of the forecast.

After the acquisition of assets during privatization, Gerdau S.A. started a broad process of internationalization—initially in Latin America and subsequently entering the American and European markets. From the acquisition strategy, the group expanded its activities in Latin America with the purchase of a set of companies from the region: Sipar Aceros (Argentina), Laisa (Uruguay), Diaco (Colombia), AZA (Chile), Siderurgica Tultitlán and Corsa Controladora (Mexico), Siderperu (Peru), and Industrias Nacionales (Dominican Republic). Outside the region, it also purchased the companies Sidernor Industrial (Spain), Macsteel Inc. and Ameristeel Corporation (United States), and the Indian company Kalyani Steel.

The *Sistema Usiminas*, which brings together the companies from the holding company Usinas Siderúrgicas de Minas Gerais S.A., has recently undergone some changes in its ownership structure, which, when consolidated, must transfer the control of the group to a set of partners formed by Japanese, Brazilian, and Argentine funds. After purchasing the company, Usiminas became one of the links in the centralization of assets in the Brazilian steel industry after privatization.

The change in the stockholding control was the result of the change in the strategies of pension funds and the Votorantim and Camargo Correa groups in reducing their assets in the steel industry. This process was concurrent to the attempt by the CSN in increasing its share in Usiminas, frustrated by the decision of the Italian-Argentine group Techint in expanding its business in Brazil. As in the case of the internationalization of cement companies, the regional rivalry seems to have driven Latin American companies in the steel sector to acquire assets considered as strategic on the continent.

Although the control has stayed with foreign groups throughout the restructuring process of the Sistema Usiminas, the participation of the Brazilian capital in the group amounts to 29%, which is equivalent to the shareholdings of the rest of the controlling block. The shares of Usiminas also comprise an important part of the assets of another major Brazilian economic group—the Companhia Siderúrgica Nacional—as well as a part of the long-term investments from Previ.

The Companhia Siderúrgica Nacional is formed by a system of companies combined from the main asset of the economic group, the Presidente Vargas Steel Mill in Volta Redonda, Rio de Janeiro. Currently, the group has equity interest in approximately 66 subsidiaries, comprising six main areas of business: steel and metallurgy, mining, cement, infrastructure, energy, and logistics. Among these activities, only the production of cement is a diversification after the privatization process, even though the group has grown in all its operating segments. After the privatization, CSN acquired a group of mills in Brazil and later in Venezuela, Peru, Spain, Portugal, and Germany.

The economic groups of basic supplies began, from the privatization, to adopt a strategy of vertical integration of their business areas, including, in some cases, the conjunction of this strategy with a magnification of the degree of internationalization, particularly in Latin America. This trend, in fact, also became common in other Latin American countries, such as Argentina and Mexico. This process resulted in an increase in the competition from large local companies of basic inputs for regional space, involving not only the large local capital but also, in some cases, big companies of the central countries in business associations.

4.3.2 Economic Groups of the Electricity Sector

The maintenance of the State participation in Eletrobrás and large State-owned companies in the electricity sector set a sectoral structure marked by strong public sector participation and by the presence of pension funds, including the major recent projects—such as the Jirau and Belo Monte plants. After the privatization process, the industrial concentration of the electricity sector in Brazil produced some big holding companies with State-owned institutions in their ownership structures.

The Eletrobrás group presented low profitability and reduced asset growth during the period. This reveals, among other things, that the group was outside the large capitalization plans of State-owned companies, such as Petrobrás and BNDES. As one of the large holding companies of the capital-intensive sectors, Eletrobrás has a significant weightage in the composition of the core of the major investments in infrastructure in Brazil. The group seemed to be consolidated as the central element of the consortia formed with private companies for the major investments in the generation and transmission of energy. Table 4.5 reveals the performance of the economic group of the Brazilian electricity sector.

In the case of new energy investments in Brazil—such as the Belo Monte hydroelectric plant—the ownership structure—which typically comprises national companies, foreign enterprises, and pension funds—is becoming common in the recent public granting processes. Taking the example of Belo Monte, the Norte Energia S.A.—the controlling company—has the following ownership structure: the Eletrobrás group has 49.98% of the shares, part of it through Chesf and Eletronorte. Besides Eletrobrás, Petros, and Funcef have 10% of the shares each, Neoenergia (controlled by Banco do Brasil, Previ, and the Spanish company Iberdrola) also has approximately 10% and, lastly, Cemig, Light, and Vale have each approximately 9% of the capital.

The CPFL Energia S.A. is the holding company set up in 1998 to bring together the assets incorporated into the Companhia Paulista de Força e Luz—the "CPFL Paulista"—from the privatization of the State-owned public companies in 1997. After a long process of corporate restructuring, the CPFL Energia's control shifted to Previ through a mutual fund of investments (33.02% of the voting capital), by VBC Energia (25.55%), a subsidiary entirely controlled by the Camargo Corrêa group and by Energia São Paulo Fundo de Investimentos (11.96%) comprising private pension funds of union control, such as the Fundação Cesp, Petros, Fundação Sistel, and Fundação Sabesp. The CPFL also has BNDESPar, with 8.4% of the share capital, and Bradesco, with approximately 3%, among the minority shareholders.

From 2000 to 2003, CPFL Energia acquired the control over the Empresa Bandeirante de Energia, Companhia Energética Rio das Antas, and bought along with its control—linked later to a capitalization opera-

Table 4.5 Performance of the electricity sector 2002–2011 (base year 2002 = 100[a])

Economic group		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Eletrobrás	Net equity	100	104.9	109.7	121.0	127.4	129.5	136.5	123.1	112.1	122.0
	Gross revenue	100	87.7	96.6	90.2	100.8	101.6	130.0	122.8	120.2	730.3
CPFL	Net equity		100.0	119.8	138.2	143.7	147.0	146.8	150.9	194.1	244.5
	Gross revenue		100.0	120.0	139.6	160.3	183.9	183.5	203.5	224.2	202.7
Cemig	Net equity	100	118.7	133.2	134.3	145.6	164.3	180.4	194.3	213.5	217.3
	Gross revenue	100	121.5	151.0	184.5	219.3	251.9	259.5	278.7	298.3	335.3
Copel	Net equity	100	105.8	114.7	126.8	153.5	170.2	186.5	207.3	253.9	269.8
	Gross revenue	100	117.1	154.1	192.9	215.2	226.8	234.6	252.2	297.8	334.5

Source: Magazine Valores Grandes Grupos

[a]For CPFL, base year 2003 = 100

tion of the holding company by the partners—of the assets of Foz do Chapecó Energia, Campos Novos Energia, and Energética Barra Grande. The group also instituted the CPFL Cone Sul, for energy trading in neighboring countries. In 2011, CPFL created the CPFL Energia Renováveis S.A., a joint venture with ERSA (Energia Renováveis S.A.)—a mutual investment fund in renewable energies—and acquired wind farms, power stations, and biomass plants, which allowed CPFL to dispute this segment in Brazil with other major groups.

The Companhia Paranaense de Eletricidade (Copel), along with Cemig, represents one of the economic groups of the electricity sector formed from a holding company controlled by federal governments in association with private capital and public funds. In the case of Copel, the capital of the holding company is composed of the State government of Paraná (58.6%) BNDESPar (26.41%), Eletrobrás (1%), among other minority shareholders. In the electrical energy sector, Copel operates vertically integrated—in the generation, transmission, and distribution—from its thermoelectric plants, hydroelectric plants, wind farms, and power stations.

Between the economic groups of the electricity sector, Copel had the highest asset growth. The company, in addition to diversifying its activities, expanded its operations in the Brazilian South, Southeast, and Central-West regions, although its internationalization is practically zero. On the other hand, Copel started an expansion plan in partnership with the Chinese company State Grid, acquiring the granting on a complex transmission network, linking the plants from Mato Grosso to the Brazilian Southeast region. Both companies have been commenting on the expansion of their joint operations in the electricity sector in South America, which indicates a possible repetition of the pattern of internationalization in Latin America through joint ventures between local economic groups and foreign capital—as in the case of Techint/Ternium, Cosan/Shell, or Ambev/Interbrew.

The Companhia Energética de Minas Gerais (Cemig), even if it presented a lower degree of diversification than Copel, was the electric company of higher revenue growth during that period. Over the period, the group continued under the control of the Government of Minas Gerais (51% of the voting capital) but incorporated some important minority

partners. In 2010, the Andrade Gutierrez group's subsidiary assumed the foreign participation in the company and went on to control 33% of the voting capital, becoming the two main controlling shareholders of Cemig along with the Government of Minas Gerais.

After the 1990s, the company began a process of acquisition of companies in the sector. Cemig acquired part of the capital of Light S.A.—approximately 26%—in addition to a vast group of mid-size energy companies and technology centers. The Cemig, through Light S.A., along with Eletrobrás makes up the consortium for the construction and operation of the Belo Monte hydroelectric power plant. And with approximately 10% of the share capital, Cemig also participates in the controlling consortium of Santo Antônio Energia S.A.—company for the construction and operation of the Rio Madeira hydroelectric power plant—along with Andrade Gutierrez (12%), Odebrecht (18%), Amazon Energia (20%), and Eletrobrás (39%).

The holding companies of the electricity sector, after privatization, started a process of acquisition of assets, considerably raising the level of indebtedness, especially in foreign currency. During the currency crisis of 1999, the indebtedness grew exponentially, compromising the ability of investment of the companies. The growth cycle of 2003 up to 2008 allowed the holding companies of the electricity sector to reduce their indebtedness substantially, partly recomposing the investment capacity of these economic groups. It is worth mentioning that because of the ownership of the companies in the electricity sector, which comprise pension funds, foreign capital, and other local economic groups as consortia, State-owned companies lost part of their autonomy in the investment plans.

4.3.3 Large Construction Firms

Large construction firms possibly represent the most characteristic case of conglomeration in Brazilian economy. The construction business groups have specialized in taking advantage of the new frontiers of investments created in the recent period, starting a process of diversification that included the administration of shopping malls up to the building of nuclear submarines. The construction firms were also pioneering Brazilian

companies in the process of internationalization, starting to expand their activities abroad in the middle of the 1970s. In the recent period, the process of internationalization of these economic groups has also diversified, and they now include areas such as energy, mining, and public concessions, particularly in Africa and Latin America. The growth of the large construction firms in Brazil is demonstrated in Table 4.6, which shows the performance of large construction firms during 2002–2011.

The Odebrecht S.A., being the largest company in the construction industry, is a good example of the business composition that was common in the large construction firms after the 1990s: public concessions, basic inputs and energy, shipbuilding, and defense industries. The main activity of the Odebrecht group, by revenue and asset value, is the chemical industry, followed by engineering and construction, and, in the area of engineering and construction, Odebrecht performs a large number of activities such as industrial engineering (detailing, procurement, turn-key, etc.), logistics infrastructure, sanitation, real estate projects, among others.

In the petrochemical industry, along with Petrobrás, Odebrecht controls the largest petrochemical company in Latin America—Braskem S.A. The Odebrecht group also expanded its participation in energy generation, acting in thermoelectricity, hydroelectricity, wind power, and, recently, developing solar energy projects. Also in the service sector, Odebrecht began its participation in public concessions, reunited in the holding companies Odebrecht Participações e Investimentos S.A. and Odebrecht TransPort, which administer road, rail, and port grants in Brazil and other countries. Recently, the company also ventured into the management of stadiums and airports through the formation of consortia, becoming one of the biggest beneficiaries of the public concession plans in Brazil.

The group also took advantage of the expansion of the offshore oil sector in Brazil to diversify its businesses into the shipbuilding industry, with other major construction firms, through the participation in the construction and operation of shipyards—such as Estaleiro Enseada Paraguaçu in association with OAS Construtora S.A. and the Japanese Kawasaki Heavy Industries. The Odebrecht used the skills gathered in the shipbuilding sector to diversify its activities into the production of submarines, expanding the presence of the group in another new business area created in the last decade, the defense industry.

Table 4.6 Performance of large construction firms 2002–2011 (base year 2002 = 100)

Economic group		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Odebrecht	Net equity	100	127.4	198.5	218.3	186.2	228.1	162.2	216.2	527.4	606.5
	Gross revenue	100	134.8	172.1	188.5	198.0	255.5	328.7	331.1	432.2	346.1
Camargo Correa	Net equity	100	111.6	124.4	148.8	148.7	181.2	178.7	208.4	213.9	230.9
	Gross revenue	100	123.8	125.3	136.8	174.7	216.1	260.6	330.0	349.6	326.3
Andrade Gutierrez	Net equity	100	108.0	110.8	110.9	117.9	136.5	162.8	166.1	211.3	215.2
	Gross revenue	100	114.7	132.3	145.7	198.2	246.0	361.5	568.1	559.4	132.6

Source: Magazine Valor Grandes Grupos

The group also founded, in 2010, the Odebrecht Defesa e Tecnologia S.A., the holding company that gathers the companies of the group in the defense industry. In 2012, the holding company acquired Mectron, a company headquartered in São José dos Campos, São Paulo, which operates in the production of missiles and the development of radar, avionics (missiles and unmanned aircraft), and satellite systems. The Odebrecht Defesa e Tecnologia also controls the COPA Gestão de Defesa (integrated logistics management in field operations), and, in 2011, it formalized the joint venture Odebrecht Cassidian Defesa, the partnership of the group with the German company European Aeronautic Defense and Space (EADS) Company, one of the world leaders in defense and security planning and services. The joint venture has made Odebrecht the service provider company for EADS in Latin America.

The curious fact about the internationalization of Odebrecht was that the process reached a higher degree of diversification than that presented by the group in the domestic market. Odebrecht operates in the areas of construction and public concessions in Africa, Latin America, Middle East, and some European countries. In mining, Odebrecht expanded its presence to Angola, Mozambique, and South Africa. The creation of holding companies in Africa and Latin America led Odebrecht to participate as a partner in a set of distinct activities, such as catering, logistics companies, trading companies, and even a supermarket network in Angola. The group also founded the Odebrecht Óleo e Gás S.A., operating in the oil and gas exploration in Latin America and Africa.

As the other major construction firms, Camargo Corrêa underwent an intense process of diversification from the 1990s, which resulted in a conglomerate combining companies in the sectors of engineering, production of basic inputs, and public services, among a number of other smaller activities. The holding company—Camargo Corrêa S.A.—had centralized its participation in companies in agriculture, shipbuilding industry, energy, financial services, engineering and construction, production of cement, textile companies, real estate projects, and public grants. The business group also has shares in some major infrastructure

projects, such as the consortium of the Jirau Hydroelectric Plant, in which Camargo Corrêa has 9.9% of the capital—amount agreed for sale after the early stages of the work for the French GDF Suez—and in the *Sistema Integrado de Transporte de Etanol* (Integrated System of Ethanol Transport), with 10% of the share capital, in partnership with the Petrobrás, Odebrecht, Copersucar and Cosan groups.

In the shipbuilding industry, the Camargo Corrêa Naval Participações controls 46.6% of the Estaleiro Atlântico Sul, in association with the Queiroz Galvão Group and Samsung Heavy Industries, and 29.75% of the Quip S.A., also in association with the Queiroz Galvão Group. Both projects focus on meeting the demands of ships and oil platforms for the expansion of Petrobrás. The group also expanded its activities in the cement industry from the acquisition of some large national and international companies, such as Cimpor from Portugal and Loma Negra and Betel from Argentina, following the movement of Votorantim. In the clothing and footwear sector, Camargo Corrêa is the majority shareholder of Alpargatas S.A., which owns the national brands Havaianas, Rainha, and Topper and which has agreements in Brazil to distribute the foreign brands Mizuno and Timberland.

The group also expanded its inclusion in public grants and energy, through the control of CCR, a road concessionaire, and other concessionaires for the administration of airports and energy transmission lines. In the energy sector, Camargo Corrêa also owns a large number of important shareholdings, among which we highlight the ownership of 25% of the capital of CPFL Energia and another set of minority shares in several power plants.

In addition to the worst performance among the big construction firms, Andrade Gutierrez also had the lowest degree of diversification, even if it repeated the same pattern of diversification, which includes industries such as energy, public grants, basic services, shipbuilding, and defense. The group also entered sectors other than the default ones, as the telecommunications, through Oi S.A. and other companies—and logistics in health—through Logimed S.A., a subsidiary in health services.

During the 2000s, Andrade Gutierrez S.A. divided its operations and capitalized on its creation of holding companies, centering its affiliate networks on a few public companies. Two of these sectoral holding companies

have a share in other large groups, the Andrade Gutierrez Telecomunicações, which owns 19.36% of the capital of Telemar Participações (controlling shareholder of Oi S.A.), and Andrade Gutierrez Participações, which owns 14.4% of the capital of Cemig, through AGC Energia. The group also controls a considerable set of public grants in other countries, such as Quiport, concessionaire of the Quito international airport—with 45% of the capital—and Aeris, concessionaire of the San José airport in Costa Rica, with 47.5% of the capital.

In the defense industry, Andrade Gutierrez Defesa e Segurança S.A. recently signed an agreement for the creation of a joint venture with Talhes, a company controlled by the French group Dassault. The joint venture had been planned to compete in the segment of surveillance systems and unmanned aerial vehicles (UAVs or Drones), being a possible competitor in the path of diversification of Embraer, as we will address further below. With this, Andrade Gutierrez seeks to empower itself to compete with the other Brazilian construction firms, which also announced their entry into the defense industry.

With the attempt to lease the Mauá Shipyard, and the subsequent acquisition of the control of the Aratu Shipyard, Andrade Gutierrez consolidated a basic pattern, similar to other large national construction firms. This pattern is marked by the diversification in some sectors next to public investment plans, as, for example, shipbuilding, energy, and defense and security, proving the trend of large national construction firms in tracing their trajectories of diversification from the performance of the public sector. The large construction firms reorganized their structure of affiliates in public holding companies, increasingly having typical features of conglomerates of industry and services companies.

4.3.4 Economic Groups of the Mineral Extraction Industry

The extractive industry in Brazil brings together the two largest economic groups in the country: Petrobrás and Vale. Basically, two conglomerates assembled during the Process of Import Substitution that group a series of companies associated with the main activity and other

companies created from the process of verticalization. Both also lead the process of internationalization of the Brazilian capital with global presence. Table 4.7 summarizes the performance of Brazilian economic groups of the extractive industry.

The Petrobrás maintained its strategy of internationalization, which dates back to the 1970s, and resumed the diversification process that had been largely suspended during the Fernando Henrique Cardoso Government. The company also resumed its leadership in the national petrochemical industry, creating the Braskem S.A. in association with the Odebrecht group; more recently, Petrobrás took over the full ownership of Petroquímica de Suape and the Polo Petroquímico do Rio de Janeiro (Comperj), which were recent projects of expansion of the national petrochemical industry.

The Petrobrás also resumed its strategy of diversification into the fertilizer business from its base in the chemical industry, acting on the market of nitrogen compounds. In parallel, the diversification of the company followed a trajectory toward the unfolding of its activities in the energy sector, both from affiliates with integral property and through equity interest in other energy companies. In addition to the thermoelectric plants, Petrobrás also has diversified its energy activities to wind power, small hydroelectric plants (SHP), and other forms of thermoelectricity generation, such as natural gas and bioenergy (Petrobrás Biocombustíveis S.A.), including sugarcane, through shares in companies such as Guarani S.A. and Total Agroindústria Canavieira S.A. (35.8% and 43.5% of the capital, respectively).

The Petrobrás has become an important supplier of infrastructure for the major public investment projects in the recent period, especially through the new energy subsidiaries. The participation of Petrobrás, in this case, demonstrates how the large blocks of investment have come to depend on the action of the State mechanisms on different fronts. In this sense, the capitalization process of the company in 2010, which mobilized the Brazilian National Treasure, the BNDES, the Sovereign Fund of Brazil, and the Caixa Econômica Federal for the intake of approximately US$ 70 billion, enabled Petrobrás to play the role of enabler of part of the public investments through its investment plan. The exchange of securities between the State-owned company and the State around the rights

Table 4.7 Performance of economic groups of the extractive industry 2002–2011 (base year 2002 = 100)

Economic group		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Petrobrás	Net equity	100	155.7	200.2	268.3	339.8	383.9	444.4	515.3	977.5	1041.0
	Gross revenue	100	137.0	158.6	192.3	226.0	237.1	304.9	250.8	287.3	1745.4
Vale S.A.	Net equity	100	126.8	163.2	222.2	380.2	513.7	840.5	846.5	920.5	1197.7
	Gross revenue	100	136.3	198.8	246.5	334.1	468.4	520.4	352.0	594.0	1310.0

Source: Magazine Valor Grandes Grupos

for future oil prospects by the company clearly demonstrates the role of State-owned companies and public funds in the recent capitalization of the São Paulo stock exchange.

The former Companhia Vale do Rio Doce (Vale) is probably the most emblematic case of the Brazilian privatization. Privatized in 1997, the company has become one of the major mining companies in the world in recent decades. After privatization, Vale began a strategy of buying other mining companies in Brazil, consolidating its leading position in the mining industry and diversifying its activities into a large part of the segments connected to the mineral extraction industry. The other main trajectory of Vale's diversification was to develop companies to provide infrastructure for some of its projects, such as energy and logistics enterprises. In the area of logistics, as it has already been doing for some time in the mining sector, Vale is merging its assets in a single company, the Vale Logística Integrada S.A. (VLI S.A., or Valog). The process of incorporation of the assets should meet the rail and port projects of Vale in a single public subsidiary, which will rise as one of the leading logistics companies in Brazil.

The Vale also intensified its presence in mining from a vast set of operations on metallic and nonmetallic minerals, such as potassium, which serves as the basis for its strategy of diversification into the fertilizer sector, through Vale Fertilizantes S.A. The group maintained this same business strategy in its internationalization, acquiring foreign mining, energy, logistics, and fertilizer companies. The Vale, as well as other Brazilian business groups, seized the movement of high commodity prices to expand its participation in global chains related to its core business, both in the sense of occupying strategic assets in mining and in approaching downstream transnational companies more organically, such as Korea Nickel Corporation (of which Valley owns 25% of the capital) and Vale Minerais China Corporation, as well as the verticalization of its activities, such as in the association with Thyssen-Krupp in the Companhia Siderúrgica do Atlântico.

4.3.5 Economic Groups of Food Processing and Agribusiness

The growth of the Brazilian agribusiness economic groups represents a special chapter in the processes of capitalization of business groups through the State and pension funds. Of the three economic groups selected, JBS was launched to the set of the major Brazilian groups through a series of capitalizations, mostly financed by public funds: Cosan defined its trajectory of diversification from the association with the Dutch company Shell in Brazil, and BRFoods, merger between Sadia S.A. and Perdigão, had its formation made possible from the expansion of the equity interest of pension funds in the economic group. The performance of Brazilian economic groups of food processing and agribusiness is summarized in the Table 4.8.

Although the JBS group has its origin in the 1950s and had a period of great growth in the Brazilian Central-West region during the 1970s and 1980s, the group only entered the sample of 200 major companies in Brazil in 2006. This way, the merger of the groups Friboi and Bertin S.A. in 2009 contributed to it, which resulted in tripling the assets of the holding company JBS in the end. Prior to the merger with Bertin, the company had already started its process of internationalization through the acquisition of companies producing industrial meat and slaughtering units. The acquisition strategy of the JBS group during the period from 2001 up to 2006 was dedicated to the purchase of shares in leading companies in strategic markets for the JBS group, such as South America, United States, Europe, Australia, and China.

From 2005 up to 2007, the company started its process of internationalization by acquiring the assets of Swift-Armour in Argentina and the Argentine company CEPA. In 2007, the JBS Holding International acquired a number of shares in Australian and American companies, which culminated in the acquisition of Swift Foods Company in 2007, and later in the purchase of Pilgrim's Pride in 2009, consolidating the JBS group as a world leader in the beef industry. This process was only possible through the capitalization of JBS S.A. by BNDES during the second half of the 2000s. In 2007, the BNDESPar subscribed a total of approximately R$ 1.8 billion in shares, which resulted in the increase of approxi-

Table 4.8 Performance of economic groups of food processing and agribusiness 2002–2011 (base year 2002 = 100[a])

Economic group		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
JBS S.A.	Net equity	–	–	–	–	100.0	1645.8	3263.5	9385.0	9948.6	11,430
	Gross revenue	–	–	–	–	100.0	306.2	637.9	1149.8	1171.0	353.5
Cosan	Net equity	100	150.6	184.9	336.3	415.6	830.9	960.2	1271.6	1662.8	2343.9
	Gross revenue	100	111.8	136.5	183.4	271.4	204.5	538.5	1147.3	1339.7	239.6
Sadia (BRFoods)	Net equity	100	121.3	147.3	187.8	220.4	251.4	346.2	1123.5	1148.1	1181.4
	Gross revenue	100	128.6	163.2	189.1	184.7	226.1	574.5	427.6	589.9	342.2

Source: Magazine Valores Grandes Grupos

[a]For JBS, base year = 2006

mately 230% in the capital stock of the group. The following year, the BNDESPar endorsed another set of bonds relating to the financing of R$ 3.5 billion for the purchase of Pilgrim's Pride. As the bonds were not redeemed within the time limit, the BNDES converted its rights into stock, having then 31% of the voting capital of JBS S.A. In 2012, JBS made another agreement for the subscription of bonds amounting to R$ 500 million with Caixa Econômica Federal.

The Cosan accomplished the opening of its capital on the BM&FBovespa in 2005 and, in 2007, held a public bid on the New York Stock Exchange, creating the Cosan Limited, current controlling shareholder of the holding company Cosan S.A. Indústria e Comércio, the holding company that controls the activities in Brazil. The holding company comprises the Costa e Pinto group (approximately 38% of the capital), the Fundos Gávea (14.75%), and a large group of national and international investors. In 2008, Cosan incorporated the assets of the group Rezende Barbosa; with this operation, it expanded its participation in logistics, later centralizing the assets in the company Novo Rumo Logística S.A., which controls the shares in the logistics projects of Cosan. Recently, the logistics subsidiary of the Cosan group announced a bid for the acquisition of the control of ALL Logística S.A., which demonstrates the group's interest with regard to greater participation in the rail industry. Also in 2008, Cosan acquired Esso, a company of ExxonMobil lubricants in Brazil, and diversified its activities into automotive and industrial lubricants.

The following year, the company acquired some companies in the business of food processing, thus diversifying its activities to other activities in the sector, in addition to the production of sugar. In 2010, the Cosan group formalized the creation of Raízen S.A., the joint venture with Shell. With the joint venture, Raízen went on to manage the fuel distribution assets of Shell in Brazil. With the contribution of nearly US$ 1.6 billion from Shell, the company started a plan to expand, increasing its sugar-alcohol production and starting its diversification into logistics and other energies, as, for example, through the acquisition of the gas distributor Comgás. The creation of the joint venture also served to consolidate the position of Cosan as the world's largest producer of ethanol. Recently, a new capitalization of approximately R$ 350 million, operationalized by the Gávea Investimentos fund, allowed Cosan to acquire

11.7% of the capital of Camil Alimentos, associating the distribution strategy of Camil with Cosan's subsidiary in the food sector, the Docelar Alimentos e Bebidas.

The BRFoods started the incorporation of the Sadia S.A. assets from Perdigão, as part of an attempt to financially recover Sadia after the losses caused by the crisis of 2009. The crisis reversed a process of concentration that indicated a possible acquisition of Perdigão by Sadia, as was, in fact, attempted by Sadia through a proposed takeover of the controlling interest of the competitor in 2006. During the 1990s, Perdigão, after also accumulating a series of financial losses, went from family control to a set of pension funds. The Perdigão group later went through a period of corporate restructuring, until basically resulting in the current composition of BRFoods after the incorporation of Sadia. The BRFoods group is controlled by a set of pension funds—including Previ (12.8% of the capital), Petros (10.3%), Valia (1.9%), and Sistel (1.3%)—a foreign investment fund (Tarpoon Investimentos, with 8% of the capital) and a group of small shareholders—including the former shareholders of Sadia and BNDESPar.

The creation of the BRFoods represented another step in the process of concentration in the food sector, a process that has been unfolding over the last few decades in the Brazilian market, which resulted in a series of acquisitions and mergers, such as the JBS-Friboi and Bertin, and which formed the BRFoods. Adding the Marfrig group, the food sector in Brazil has focused on three major diversified companies, competing with each other and with some big multinationals in the Brazilian market, and all of them are in an accelerated internationalization process. With the growth of JBS and with the mergers and acquisitions that occurred, the Brazilian sector of processed foods in the recent decades has undergone an in-depth corporate restructuring, which resulted in a strong increase of the size of the national leading companies.

4.3.6 Big Banks

Among the economic groups linked to the financial activity, we decided to keep in the panel presented only the two groups with the greatest diversification toward industrial activities: the Itaúsa (Itaú-Unibanco)

and Bradesco, whose holding company of interest—Bradespar—is involved in a long chain of indirect control through its participation in Valepar, the controlling holding company of Vale S.A. The controlling shareholder of the Itaú group, Itaúsa, among the financial groups, is the only one with direct control over industrial enterprises.

Despite the familiar control—from the Setúbal and Villela families—Itaúsa also has among its most important shareholders the Petros fund, with 13.8% of the voting capital. The Itaúsa has control over some large companies in the internal market, with consolidated presence and in the process of internationalization. The diversification toward the manufacturing industry focused on building materials (bathroom ceramics and metals, laminate floors, hardboard, and wood panels), through the subsidiary Duratex S.A.—owner of Hydra and Deca, among others—and in the chemical industry, through Elekeiroz, which focuses its business on the second-generation petrochemical.[6] In the service sector, the Itaúsa group diversified its activities to real estate administration, public concessions, and energy.

Table 4.9 shows the performance of Brazilian big banks during 2002 to 2011. The Bradesco, despite the major participation in Vale, kept a profile much more focused on the financial activity, unlike Itaú. Nevertheless, the process of diversification of Bradesco was less pronounced than that of the other groups studied. The growth of the bank, especially from 2006, is related to its process of diversification of the financial activities and the growth of its affiliates. Thus, Bradesco has become a big financial conglomerate in recent decades, having representative companies in a wide range of financial services.

Although the composition of the assets kept the same pattern during the studied period, the growth of values was significant, amounting to an increase of approximately 1100% of total assets since 1994. The trajectory of diversification was comprehensive within the financial industry; Fundação Bradesco controls, in addition to the holding company Banco Bradesco S.A., the Bradespar, holding company of the same group, which brings together some major holdings, such as Valepar and CPFL Energia. The bank holding company controls two other major companies in the group, Bradesco Seguros and Bradesco Saúde S.A.—which has some important interests in networks of private clinics. The bank has shares in

Table 4.9 Performance of big banks 2002–2011 (base year 2002 = 100)

Economic group		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Itaúsa S.A.	Net equity	100	128.4	151.9	168.8	251.1	308.8	433.4	528.2	261.9	636.8
	Gross revenue	100	80.3	98.6	117.1	157.3	169.6	273.0	348.2	142.1	497.5
Bradesco	Net equity	100	126.5	143.8	217.9	284.3	345.6	425.3	485.5	554.6	629.3
	Gross revenue	100	102.0	103.5	134.7	158.0	170.3	221.0	245.5	274.9	661.6

Source: Magazine Valor Grandes Grupos

a set of financial services firms, such as Cielo S.A. (28.65%) and other securitization, pension, leasing, investment fund, insurance, and brokerage companies.

The incorporation of some Brazilian financial groups by other groups after the round of privatizations concentrated the competition in the Brazilian market in basically six major groups: four domestic ones—Banco do Brasil, Caixa Econômica Federal, Itaú, and Bradesco—and two foreign ones—Santander and HSBC. The fierce contest for the domestic market can be one of the factors that contributed to the internationalization strategies that are more focused and less wide for the Brazilian financial groups than groups in other sectors.

4.3.7 Technology-Intensive Economic Groups

The Embraer and Oi S.A. are among the 20 major Brazilian business groups, the only ones whose main activity is technology intensive (although it can be argued that Petrobrás could also be part of this group). In both cases, one of the striking features is the significant participation of foreign capital among the controlling shareholders. In the case of Oi S.A., the corporate restructuring process is still in progress, with a possible incorporation of the company by Portugal Telecom. Table 4.10 reveals the modest performance of technology-intensive Brazilian economic groups—the data demonstrate the poor performance of these economic groups in the period when compared to the other ones.

After a long period of negotiations between the controlling shareholders and minority shareholders, Telemar presented a proposal to purchase Brazil Telecom in 2008, also involving some stock exchanges. The Telemar then merged its business with Brazil Telecom, centralizing the assets at Oi S.A., the new holding company, with Telemar Participações S.A. as the controlling shareholder. After a mutual stock purchase agreement finalized in 2012, Oi S.A. and Portugal Telecom consolidated a long process of corporate restructuring. In the end, Portugal Telecom had the possession of 6% of the capital of Oi S.A. and 12% of Telemar Participações, which controls Oi S.A. with 41.7% of the capital. The Telemar Participações also has Andrade Gutierrez Telecom (19.36%), LF

Table 4.10 Performance of technology-intensive economic groups 2002–2011 (base year 2002 = 100)

Economic group		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Oi S.A.	Net equity	100	97.3	92.1	94.7	108.7	127.0	108.7	148.5	190.3	208.2
	Gross revenue	100	124.3	143.8	156.7	164.3	168.4	179.6	306.4	303.3	377.6
Embraer	Net equity	100	115.8	139.9	154.5	169.1	173.7	194.6	166.7	165.5	184.4
	Gross revenue	100	86.7	136.9	124.2	116.4	141.5	161.1	148.8	127.2	132.9

Source: Magazine Valor Grandes Grupos

Telecom—from the Jereissati group—(19.36%), BNDESPar (13%), Fundação Atlântico (11.5%), Funcef (7.48%), Petros (7.48%), and Previ (9.69%) as its main controlling shareholders. In this process, Oi S.A. also went on to own 10% of the capital of Portugal Telecom.

The Embraer, in the mid-1990s, came from a long period of deterioration of its financial indicators, resulting from the sum of the world demand retraction, the need to migrate to a new product cycle, and the lack of an investment plan by the government for the State-owned companies. In 1994, the company was sold to the consortium led by the financial company Bozano Simonsen and the Previ and Sistel funds, among a few other foreign investment funds. Between 2005 and 2006, the company went through a corporate restructuring, which resulted in a public company with widely held stock, with Previ controlling 10.4%, the foreign funds controlling approximately 20.5%, BNDESPar controlling 5.4%, and the company Bozzano-Simonsen controlling 4.3%, in addition to approximately 57% of free float shares.

After the process of corporate restructuring, Embraer started a set of technological development plans through joint ventures. Among these projects, we highlight the association with Lockheed Martin in the United States, the association with the French Zodiac Aerospace—for the production of cabins—and recently, a joint venture with Agusta Westland for the production of civil and combat helicopters. Also in the defense sector, Embraer Defesa e Segurança S.A. was created to centralize the shareholdings acquired by Embraer S.A. In this sector, Embraer created, in partnership with the Israeli Elbit, the Harpia Sistemas S.A. for the development of UAVs, and bought Orbitsat, a company of radar systems. The Embraer is still developing plans for the production of its own military cargo planes, UAVs, and combat helicopters.

The interaction of Embraer and the major construction firms in the defense sector has been showing interesting features. The economic groups involved have been developing relations as both suppliers and competitors, such as, for example, the creation of competitors in the delivering of UAVs and monitoring systems but, at the same time, suppliers of systems for military vehicles, radars, and defense and security services. The diversification of the major national groups for the defense sector is, roughly speaking, forming a network of associations between companies that is materializing a (proto) defense industrial complex in Brazil.

4.4 Final Remarks

If we observe the industry data, there were no major changes; when we observe the evolution of the major economic groups, the situation is somewhat different, especially in relation to their ownership structure and forms of financing. The relationship between privatization and financialization changed the links between family-controlled companies, pension funds with strong union influence, and part of public bureaucracy. These arrangements undoubtedly had promoted relevant transformations in the Brazilian business system, as it can be seen by the entry of companies in the defense industry and the growing presence of these economic groups in Latin America and Africa.

In a way, the discussion presented here seeks to rescue some contributions regarding the patterns of capital accumulation in the periphery and the possibility of the replication of advanced forms of capitalist relations in peripheral economic structures. The formation of State-owned funds of centralization of capital during the process of late industrialization and the triggering of union funds during the privatization process resulted in the formation of a specific set of financial funds that became the main players in Brazilian economy. The growth of these funds had defined a particular trajectory in which the Brazilian economic structure was "updated" in relation to the changes in the international capitalist system.

However, unlike the process of centralization of capital in the Fordism Age, the late development of business conglomerates in some peripheral countries faces less nationally integrated production chains and the predominance of multinational companies on most global chains of value. Given the restricted character of the process of centralization of capital in the periphery—in sectorial and financial terms—there are no previous results to be expected in terms of its contribution to the social economic development.

On the contrary, the political turmoil nowadays in Brazil involving most of these business groups demonstrates how hard it can be for the society to exercise control over the financial relations between State-owned companies and business groups. The recent scandals of corruption probably will inflict serious financial damage to the business groups, in the best scenario. The Brazilian big construction companies are probably

going to lose several of their foreign assets, and the infrastructure investment projects are practically frozen.

The size of the current crisis in Brazil has created a complex juncture. For the business groups that are not involved in any case of political scandal—that are few in number—the economic recession is producing a generalized fall of the profits. For those involved in criminal accusations, it is difficult to predict how they will restructure their business areas. The coup d'état in 2016 has thrown the country into a period of institutional uncertainty which will require a redefinition of the relations of public and private sector.

Notes

1. We excluded from the 20 major groups the financial groups of low diversity—in this case, *Banco Safra* and the insurance company *Porto Seguro*—in addition to the economic groups with mostly foreign capital, keeping the large State-owned companies. During the period analyzed, Suzano and Embraer alternated between the position of 20th major group; in this case, we chose to keep Embraer in the analysis. However, we can say that the Suzano Group had a singular trajectory. After a few years of loss, the Group sold its assets in several areas and focused on its core business: pulp and paper.
2. On the corporate restructuring process of the privatized sectors, see Rocha and Silveira (2015) and Rocha (2013).
3. Despite some classic cases of denationalization of certain sectors such as the automotive and telecommunications ones.
4. BNDESPar is the BNDES subsidiary that operate in the stock market, aimed at expanding the capitalization for Brazilian companies.
5. The "privatization currencies" are securities issued before the National Privatization Program or created to be exchanged during the privatization process. Up to 1996, this mode of payment was the most widely used during the process. This instrument was created to encourage the private sector in the participation of the privatization process, mainly because of the high discount that these securities had on the aftermarket (Carvalho 2001).
6. Recently, the group sold its Itautec company of information technology and banking automation.

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5

Innovation for Competitiveness in Brazil: An Overview of Recent Performance and Main Government Policies

Newton K. Hamatsu and Caio T. Mazzi

5.1 Introduction

Brazil has recently faced its worst recession in history. After two consecutive years of strongly negative growth (−3.8% in 2015 and −3.6% in 2016) and a weak recovery contaminated by the unstable political scenario in 2017 (only 1% increase in economic activity) perspectives are still not very impressive: growth forecast is only 1.34% for 2018.[1]

The opinions expressed in this chapter are the author's own and do not necessarily reflect the view of Brazilian Innovation Agency (Finep).

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The situation seems particularly shocking for Brazilians because it came immediately after the first decade of the 2000s, the most prosperous period since the 1970s. In the first ten years of this century, GDP annual growth rate averaged 3.65%, compared to only 2.6% in the 1990s and 1.7% in the 1980s. Simultaneously, the country experienced a period of sharp decline in poverty and income inequality. Between 2001 and 2011, the income of the poorest 10% grew by 91.2%, while the richest 10% experienced an increase of only 16.6%. That allowed the Gini index to fall from 0.594 to 0.527 and the poverty level to drop from 24% to 10.2% of the general population (IPEA 2012b). Consequently, this period of growth also had a significant social impact because unlike in previous experiences, prosperity was distributed towards the poorest segments of society. However, the simultaneous return of low economic activity and unemployment is endangering the social improvements obtained in the previous decade.

It is not our intention here to discuss exhaustively the recent economic crisis. However, we do believe that such discussion should pass by the poor performance of productivity and the lowering external competitiveness of the economy, particularly of the manufacturing sector, during the economic growth period. Indeed, the average growth of total factor productivity in the first decade of this century (1% per year) was slightly above the OECD average (Aguiar et al. 2013), with labor productivity in manufacturing increasing by an annual average of only 0.4% between 2000 and 2009, according to De Negri and Cavalcante (2014), or −0.6% as measured by IPEA (2012a). Meanwhile, the share of commodities in total exports rose from 37% to 51% between 2001 and 2011 and the share of goods with medium or high technological intensity fell from 36% to only 23% in the period (IPEA 2011).

Different factors are usually pointed as causes for this performance. Macroeconomists tend to emphasize monetary and exchange rate policies as especially unfavorable to domestic production in the period, but other commonly cited aspects are education and human capital, the business environment and institutions, infrastructure, and in a smaller proportion, the innovative performance of firms (De Negri and Cavalcante 2014). In the following sections we will focus on the latter issue and on government policies in place that try to influence innovation in domestic firms. Among the factors mentioned previously, this has been the least emphasized

in the existing political and economic discussions and, at the same time, is the most challenging within the current institutional framework.

This chapter is divided in four sections besides this introduction. In the next segment we explore and compare national innovation indicators to show how innovative performance in Brazil's business sector has stagnated. Section 5.3 explains government initiatives that are currently in place to alter such a scenario, with a focus on support instruments available to private companies. Our brief conclusion comes in Sect. 5.4.

5.2 Innovation in the Business Sector: Low Performance, Wherever You Look

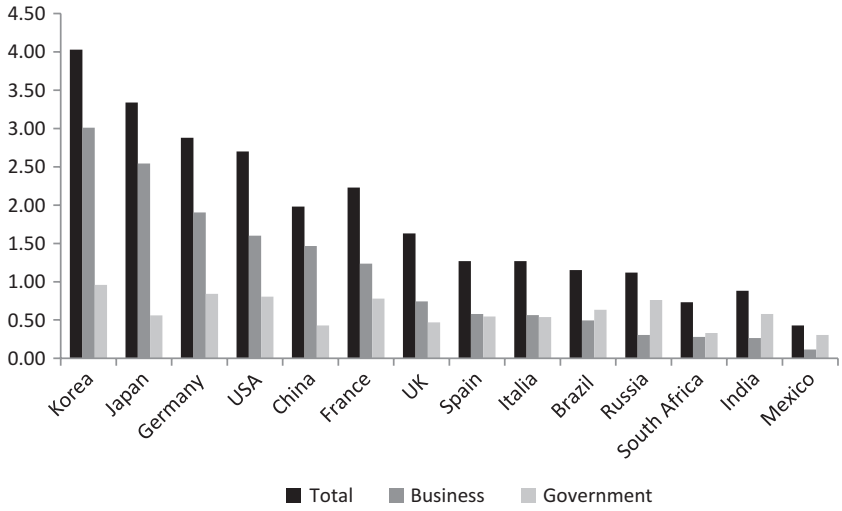
The low performance of the Brazilian industry and its productivity trajectory is well documented. IPEA (2016) provides a comprehensive overview of this process, analyzing the issue using different methodologies, periods, and international databases and indicating unequivocally that productivity is relatively low, has been growing slowly since the 1980s, and that this picture has not changed during the prosperity that marked the first decade of this century.

There is significant theoretical and empirical evidence indicating the importance of innovation for productivity and competitiveness. Innovative firms tend to be more efficient and productive. They are also more likely to export and overcome the sunk costs of entry in foreign markets. Firms that develop new products are more likely to open and consolidate new markets, differentiate themselves from their competitors, and establish technological barriers to the entry of rivals.

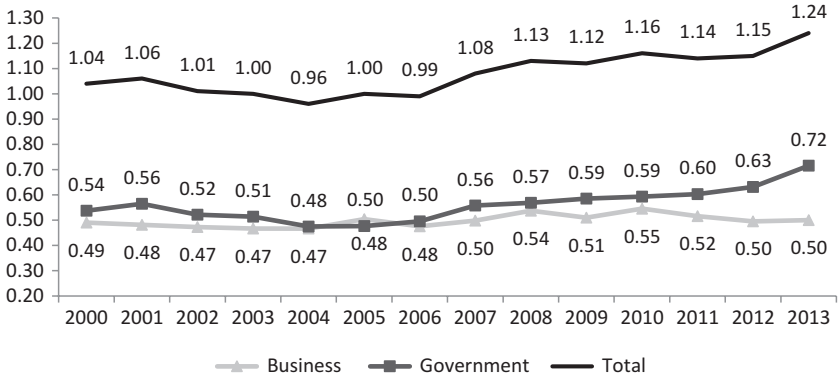
Empirical evidence in favor of a positive causal relation between innovation and productivity is very broad and robust to different periods, countries, and methodologies. Griliches (1998) compiles a set of empirical studies on the strong relationship between innovation inputs, especially private spending on R&D, and total productivity of factors of production at the level of firms, sectors, and countries. Relatedly, the positive causal relationship between innovation and exports is also demonstrated by empirical research. Recent work by Caldera (2010) and Becker and Egger (2013) found better export performance among firms

that engage in product innovations, and the former finds evidence that also process innovations favor exports. Dosi et al. (2014) show the dominance of technological factors over cost factors (wages) to determine the international market share and the likelihood of firms to become exporters, both at the level of companies and at the level of sectors.

The Brazilian reality, however, is not encouraging in this regard. Castro et al. (2005), after analyzing data from the first Innovation Survey in Brazil (the PINTEC 2000), concluded that at the time innovative effort of firms in Brazilian manufacturing was still insufficient to achieve higher growth rates and integration to international trade flows in higher value-added products (Castro et al. 2005). A direct international comparison of the available data indicates that this conclusion remains valid 15 years later. Graph 5.1 provides an international comparison of R&D expenditures by the government and the business sector for several developed and developing nations. It shows that R&D expenditures in Brazil trail OECD levels and China, although stay above important developing countries. Government expenditures seem to be relatively close to other countries, but Brazil lags significantly in terms of business expenditures



Graph 5.1 International R&D investment/GDP in 2012 (%). (Source: Author's elaboration with data from MCTIC)

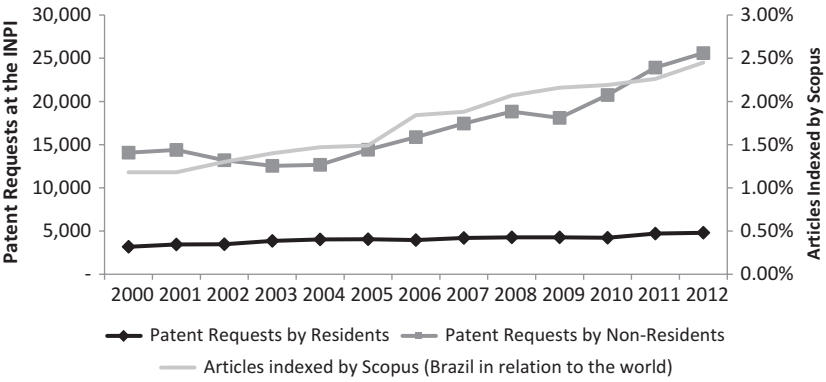


Graph 5.2 R&D expenditures as percentage of the GDP. (Source: Author's elaboration with data from MCTIC. Business and Government expenditures do no sum to the total because of private higher-education expenditures that are not included)

in R&D, which is lower than government expenditures. This pattern is common to other developing countries but is not found in any of the selected OECD countries except Mexico, suggesting a necessity to promote private investment in R&D in Brazil.

Graph 5.2 provides a picture of R&D expenditures in Brazil between 2000 and 2013. An important change seems to have occurred in 2007, especially between 2011 and 2013, when an upward trend in overall R&D expenditure in the country emerged. In 2013, Brazil had its highest R&D investment rate since the beginning of the series, reaching 1.24% of GDP. However, that growth was due exclusively to increases in government R&D expenditures, which jumped from 0.48% in 2006 to 0.72% of GDP in 2013. The business sector depicts very limited evolution, with a small increase between 2007 and 2010, and a subsequent reduction pointing back to the initial level of the series.

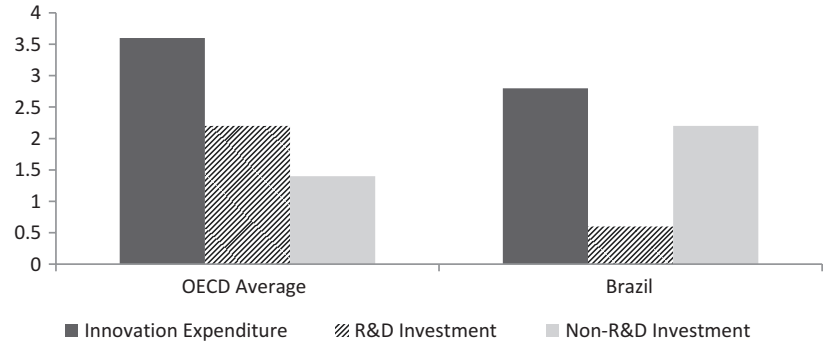
It is worth noticing that the recent increase in government expenditures in R&D seems to provide observable results. In Brazil, virtually all basic research is carried out in public universities or research centers linked to the government; therefore, it is not surprising that some scientific output indicators, such as publications,[2] have evolved rapidly. Nevertheless, the less favorable performance of the business sector made innovation indicators not to move up at the same pace. Graph 5.3 shows



Graph 5.3 Publications and patent requests at INPI. (Source: Author's elaboration with data from MCTIC)

that the Brazilian share of Scopus-indexed articles grew from 1.18% in 2000 to 2.45% in 2012, a very significant result considering many countries also increased sharply the number of published articles in the period. The growth in the number of patents requests in the National Institute of Intellectual Property (INPI), however, grew modestly compared to international trends, moving up only 50% for domestic residents and 81% for non-residents in the period. In this case, and in opposition to the publication of articles, Brazilian participation in world patents has remained almost stable. In 2010, when compared to 75 countries, Brazil occupied the 54th position in patent applications to GDP (1.38 patents per billion dollars) and ranked 55th among 82 countries in terms of patents per capita (13.9 patents per million inhabitants).

The low level of business expenditure in R&D in Brazil can also be observed in the number of researchers currently employed in the country. In fact, Brazil remains significantly below all OECD countries in terms of researchers employed relative to population, alongside technologically less dynamic emerging economies like Mexico and South Africa (OECD 2015). In fact, most researchers and post-graduates from the fields of engineering and science continue to be absorbed by the public sector. For example, in 2012, only 10% of graduated Brazilian physicists worked in private companies and nearly 60% of researchers were working in univer-

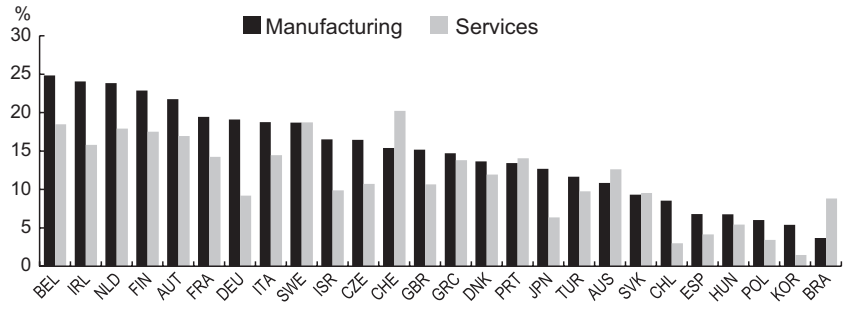


Graph 5.4 R&D investment and non-R&D investments relative to sales in manufacturing (%). (Source: Author's elaboration with data from IPEA 2016)

sities, while in Germany 65% work in the private sector and in the United States that number reaches 75%.

According to Baessa et al. (2005), the innovative activities of Brazilian firms are marked by low absolute investment levels, high relative expenditures in purchase of machinery and equipment, and few human resources allocated to R&D. These characteristics corroborate the view that the national technological system is predominantly characterized by imitation, and technical change is highly restricted to the absorption and improvement of innovations developed abroad. This is further corroborated by Graph 5.4, which compares the division of innovation expenditures in Brazil and the OECD average. It supports the view that the innovation pattern of Brazilian firms is not dynamic when it comes to product differentiation and the generation of new technologies. The strategy of companies seems focused on reducing costs by incorporating new machinery and equipment, with expenditures in R&D activities significantly below more developed countries.

This pattern is reinforced comparing the percentage of firms that declared having performed product or process innovations between 2010 and 2012 (35.6%) with the percentage of firms that declared having introduced new products to the market (3.7%). While the former number is relatively high, surpassing countries like Japan, Korea, and Israel (and is above the level reached in 2001–33.5%), the latter is the lowest in the OECD sample (and below the 2001 level—4.2%). It seems that the



Graph 5.5 Manufacturing and service firms that developed products new to the market (2010–2012). (Source: Author's elaboration with data from OECD 2013a)

innovative efforts of Brazilian companies are focused on simpler, incremental process innovations with low risk and limited impact to firms and their markets. Limited investment is directed to new products, i.e. products that previously did not exist and required higher risk taking and innovative efforts. This patter is depicted in Graph 5.5. In the services sector, this rate rises to 8.8% which is more in line with other countries in the sample.

Overall, indicators suggest that innovation remains an important challenge and that the innovative performance of Brazilian firms has been stagnated, at best, in the last 15 years. Innovation has not contributed to increase Brazil's growth rate and has possibly helped position Brazilian firms in a fragile situation against its foreign, more innovative competitors.

Although innovation is still a theme of low relevance in the national political agenda, there are important initiatives under way by the Brazilian government to support the expansion of business activities in the area. In the next section, we present a summary of the current situation and some initiatives that can potentially have a positive influence in this scenario.

5.3 Main Existing Mechanisms to Support Innovation in the Private Sector in Brazil

The international empirical evidence points to the existence of additionality effects in government subsidies for business expenditures in innovation. According to a major survey done recently by Zúñiga-Vicente et al. (2014) with the most relevant empirical articles published in international journals on the effects of government subsidies to innovation, totaling 77 articles, over 60% indicated additionality effects on private expenditures, while less than 20% indicated substitution effects.

The main justification for government intervention to support private R&D activities suggested by traditional economic theory is related to market failures, that is, to the idea that knowledge is non-rival and to a large extent also non-excludable (Hall 2002). Thus, the social return on investments to produce knowledge may not be fully appropriated by the investor, therefore causing knowledge production to be below the theoretical optimal level in an efficient market solution.

Neo-Schumpeterian economists emphasize the role of technological capabilities to explain growth and trade patterns among countries. Therefore, the international distribution of innovative capabilities becomes a fundamental factor in this context and the institutional framework that influences the dissemination of knowledge, including governments, is the main structural variable underlying different international performances.

Another key feature of innovation expenditures is the extreme uncertainty about its results, particularly in the early stages and facing the development of radical innovations. This aspect, coupled with the intangibility of the results generated in most R&D activities, makes financing these projects a complicated issue for financial markets. Consequently, there is a chronic rationing of funds for R&D of new technologies (Zúñiga-Vincent et al. 2014).

Since the late 1990s, when the first sectoral innovation funds were created, the importance of the innovation agenda has been growing in Brazil. Indeed, there is an effort of the Brazilian government, inspired by the experience of technologically more successful countries, to equip the

national innovation system with the same support mechanisms that exist in developed countries. Indeed, the framework of innovation policies evolved in Brazil in recent years and appears relatively complete in terms of the existence of support instruments for innovation activities in the private sector. Currently, Brazil has many of the tools historically used in Europe and the United States to foster innovation, such as: (i) subsidized credit; (ii) mechanisms to support startups and venture capital (VC); (iii) grants for private firms; (iv) tax incentives; and (v) public procurement mechanisms for innovation.

Each of these instruments will be discussed in more detail in the remaining of this section. We will demonstrate the evolution in the existing institutional framework, but also to point out some existing limitations and challenges for these policies to meet the needs of the domestic business sector.

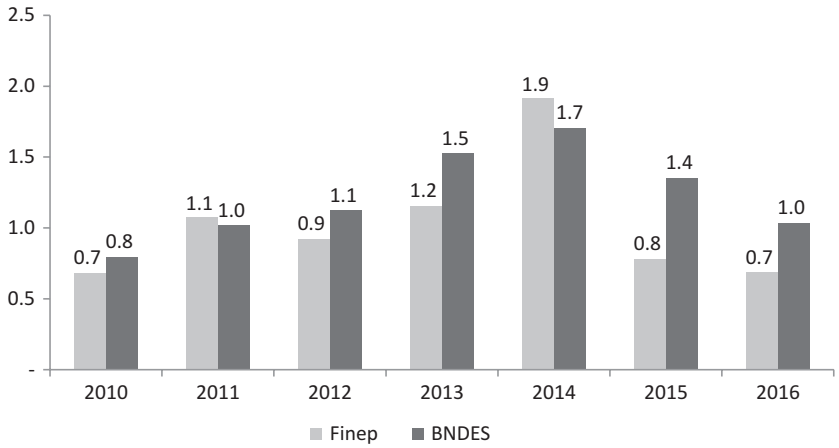
5.3.1 Subsidized Credit

The main (public) institutions that provide credit for innovation in Brazil are Brazilian Innovation Agency (Finep)[3] and National Bank of Social and Economic Development (BNDES).[4] In 2014, Finep disbursed US$ 1.9 billion in this modality. Although direct funding for innovation is not the focus of BNDES, the bank disbursed R$ 1.7 billion for innovation in 2014.

As seen in Graph 5.6, the volume operated by both institutions has grown significantly over the past few years, going from a level of around US$ 1.5 billion disbursed in 2010 to approximately US$ 3.6 billion in 2014. This increase was made possible mainly by government countercyclical actions via the Investment Sustentation Program (PSI), which from 2009 to 2015 offered additional credit lines for investment projects.

The data for 2015 and 2016, however, are well below those of 2014. Some reasons explain this fact, such as the beginning of the economic crisis and the supply of subsidized resources in worse financial conditions.

Internationally, the supply of subsidized credit is not the most popular instrument to support innovation. Most countries prefer to offer grants and tax incentives. The main reason is that credit does not have the most



Graph 5.6 Credit for innovation in Brazil (2007–2014)—Disbursements in billions of USD. (Source: Author's elaboration with data from Finep and BNDES)

suitable characteristics to support high-risk projects,[5] as usually is the case for more innovative technologies. Therefore, it tends to focus on lower-risk innovations that are "closer to market", such as process or product incremental innovations or adaptations of technologies already in use abroad. From this perspective, it is unlikely that credit could have a significant impact on the currently prevailing pattern of innovation among Brazilian companies.

However, authors like Zúñiga-Vicente et al. (2014) indicate that the crowding-in effect of public spending tends to be higher in the case of firms that suffer from credit restrictions to finance promising projects. In Brazil, this dimension is especially relevant given the absence of a private system of long-term financing. Currently, BNDES and other state-owned financial institutions practically monopolize the long-term financial market in Brazil. This situation is caused by the high level of the basic interest rate—the Selic rate, which usually runs above 10% per year—and by its high volatility (Carneiro and Carvalho 2009). In fact, in June 2015, the three main public banks—BNDES, Caixa Econômica Federal (CEF), and Banco do Brasil (BB)—were the main long-term lenders in the country, totaling 92% of market share.

Thus, the existence of a long-term credit market with significantly subsidized rates for innovation has the potential for unlocking private investments in new technologies in Brazil. In fact, at least two relatively recent empirical studies (De Negri et al. 2008; Avellar 2009) indicated additionality effects in credit policies for innovation in the country.

The stabilization of a long-term credit-supply level for innovation, however, has been facing some difficulties. Innovation credit lines of the PSI were not renewed for 2016 by the federal government. At the same time, the other main source of funds for innovation, the[6] National Fund for Scientific and Technological Development (FNDCT), has had its financial capacity significantly reduced since 2014.

The Brazilian government also announced in the begining of 2017 that the supply of subsidized credit in the economy will be further reduced in coming years. This will certainly be a great challenge for national companies that innovate, given the challenges encountered in obtaining funding for these activities in the private sector.

5.3.2 Support Mechanisms for Startups and Venture Capital

Another funding mechanism for innovation activities available in a number of countries is VC, with growing importance to angel and seed investments aimed to finance startups and small companies.

The importance of VC and support of startups is emphasized by several authors. Kortum and Lerner (2000), using US data, demonstrated that the VC has a significant effect on patenting and estimated that each dollar invested by VC is three times more valuable to generate patents than a dollar spent in daily activities of R&D. In addition, patents derived from companies that received VC contribution are cited more often than the others (Kortum and Lerner 2000). Using data from Germany, Tykvova (2000) also finds a positive relationship between investments in VC and patent applications (Hirukawa and Ueda 2011).

Other authors, such as Mazzucato (2013) and Hopkins and Lazonick (2012), relativize the importance of VC. According to them, these funds

usually do not have the patience and risk appetite needed for more radical innovation projects, which are riskier and require more time to mature. Moreover, these funds usually only focus on low-capital intensive sector, in order to ensure the high level of diversification of their portfolios.

Although this debate is under way, internationally, public resources have been an important source, if not the main, for VC. Major centers of entrepreneurship, such as those located in Silicon Valley (the United States), Singapore, and Tel Aviv (Israel), count with a high government presence (Lerner 2010). In the United States, for example, these initiatives began more than half a century ago through the Small Business Investment Company (SBIC), which is still in operation. At state level, more than 44 US states were operating funds that held VC investments at the end of 2006 (Brasil 2014).

Other OECD countries also support VC. In 2013, there were 96 VC funds with the presence of public capital in the OECD, representing 21 of its countries (OECD 2013b). It is noteworthy that, after the 2008 crisis, there was a rise of public capital prominence, especially in Europe, reaching 40% of the funds raised in VC in 2013 (OECD 2013b).

Within this category of VC, the seed and the angel investments[7] are of higher importance because they normally represent the first and riskiest contribution into a new business, and are normally made by angel investors, which in addition to financial resources provide the business knowledge to structure their business plans, leveraging the success of these initiatives and facilitating access to a network for the companies.

Some government initiatives have also sought to develop seed and angel funding in Brazil. Finep[8] operates in the segment since 2001 and intensified action in 2005. In total, Finep has approved eight investments in seed capital funds. In all, the funds landed resources in 39 innovative companies, with total equity commitment of R$ 340.5 million.

BNDES, for its turn, launched in 2007 a seed fund, the Criatec I, with committed equity of R$ 100 million. In 2013 and 2014, BNDES launched two other funds, the Criatec II and the Criatec III, which have a total amount of R$ 386 million of committed equity and provide up to R$ 6 million to each company. Another initiative is the InovAtiva program, of the Ministry of Industry, Foreign Trade and Services (MDIC),

which seeks to provide mentoring and access to a network of contacts to innovative companies with sales of up to R$ 3.6 million.

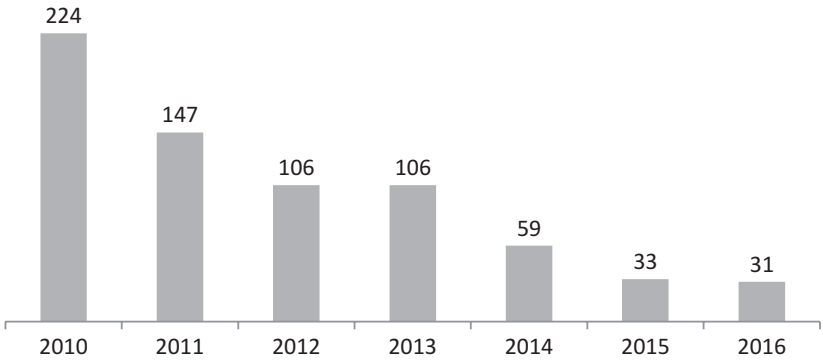
However, the seed and angel capital market in Brazil are still incipient. An example is the stock of angel investments of only R$ 260 million (US$ 70 million) invested by 6500 angel investors in just over 1500 companies, while the United States has a stock of US$ 22.9 billion, from 268,000 angel investors, targeted the 67,000 companies; the European Union has a stock of US$ 7.6 billion, from 271,000 investors (2013 data, for Brazil data is for 2014).

Although there are important initiatives in course, they do not seem to have the scale required to change the low presence of the VC segment in Brazil significantly. Given these and other institutional advances, investments in VC have increased 78% between 2011 and 2013, from US$ 183 million to US$ 326 million (ABVCAP 2014). However, the stock of investments in VC in Brazil in 2013 was the equivalent of 0.015% of the GDP, 40 times less than in Israel, 14 times less than in the United States and 7 times less than in India.

5.3.3 Grants for Firms

The Innovation Law, enacted in 2004, created grants for private companies for the first time in the framework of the Brazilian Innovation System, allowing direct granting of non-refundable money to firms exclusively for innovation projects expenses. This enabled in Brazil an instrument already in extensive use in advanced economies. Grants are one of the most powerful tools to induce high-risk innovation in companies. In Brazil, it is operated only by Finep with FNDCT resources and always preceded by a public call.

Despite its importance, the volume for the economic support has fallen in recent years, as seen in the Graph 5.7. After reaching a level of US$ 224 million in 2010, its volume has been reduced to only US$ 31 million in 2016. The main reasons for this trend are the reduction in available resources in the FNDCT,[9] caused by the fiscal austerity and the reallocation of resources towards other types of expenses.



Graph 5.7 Finep—subsidies for companies—disbursements per year (millions of US$). (Source: Author's elaboration with data from Finep)

In recent years, there was an effort by the government to increase the impact of grants through the Inova Empresa Plan. Grants are aimed at R&D activities, but it is well known that those represent only part of the innovation process. After its development, a new technology generally still has the challenges of scaling up and commercial deployment. Therefore, the success of R&D projects to produce innovations can be leveraged with the provision of other instruments, such as credit and equity.

Thus, the Inova Empresa Plan was designed and operated by Finep and BNDES in 2013 and 2014, with the provision of a set of support instruments such as credit, grants for companies, grants for research institutes, equity, and public procurements for some sectors. The idea underlying the program was to support innovation in its systemic character, that is, to mobilize all companies participating in the production chain with the purpose of solving specific technological problems of the industry.

This initiative was inspired by well-known and successful experiences of countries like the United States in its military-industrial complex, clean technology and semiconductors sectors, as well as Sweden, India, and China, among others. In the health segments, for example, the Inova Empresa Plan managed to combine credit, grants, and public procurement to develop drugs demanded by the Unified Health System, Brazil's public healthcare program.

Although the initiatives promoted by Inova Empresa have been recognized as successful, they have not been continued by the federal government, mainly due to a lack of resources.

Brazil also has other non-refundable support mechanisms for innovation projects targeted at partnerships between research centers and businesses. The most important are the Funtec, operated by BNDES, non-reimbursable FNDCT money for research centers, operated by Finep, and resources from Embrapii.[10] These instruments are targeted at public and private research institutions for joint innovation projects with the business sector. Although these instruments are relevant, our analysis of them is not extended, since the focus of this study is on the instruments of support available directly to private companies.

5.3.4 Tax Incentives

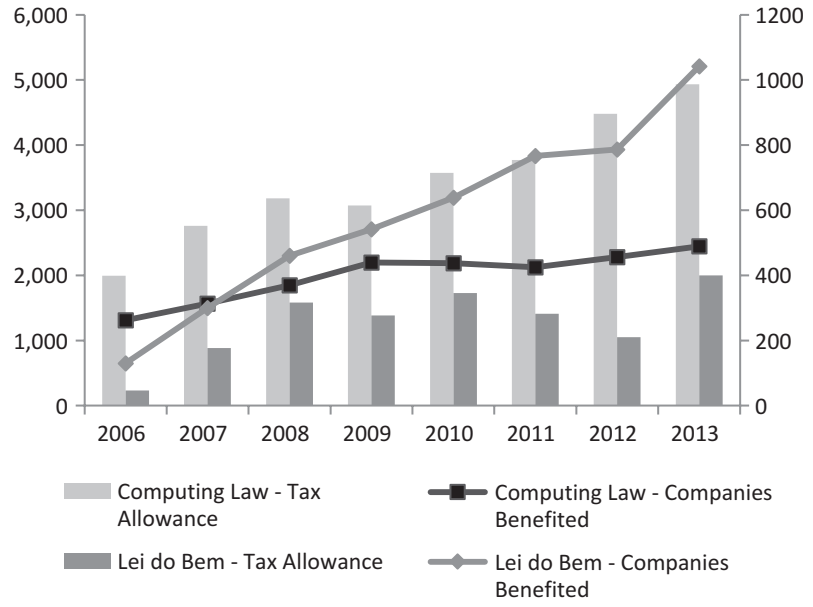
Tax incentives for innovation have become an international trend in recent years. Some authors indicate some features that make them attractive to policymakers: (i) they are flexible, since the decision-making process concerning the development of innovation and how much to spend in it is up to the firm; (ii) they do not discriminate sectors; and (iii) they are readily available to businesses and have low administrative cost to the government (Araújo 2012).

However, tax incentives are subject to a number of criticisms. Firstly, they virtually exclude small businesses in Brazil, since their most common tax system does not allow then to take advantage of these incentives. Secondly, they tend to change the overall composition of the business R&D invested by a given country, since tax incentives stimulate the execution of more profitable innovation projects which are less risky and have shorter time to market, thus leaving aside projects with high social returns, but longer development time required, subject to greater uncertainty and likely more intense spill-over effects (Araújo 2012). Finally, a set of research has pointed to no evidence of actual positive impacts of tax breaks on R&D activities (Mazzucato 2013).

Be that as it may, currently 27 out of 34 OECD countries offer some form of tax incentives for innovation. In Brazil there are also tax mechanisms to stimulate investment in R&D, particularly the Law of Informatics and Law do Bem.

The Informatics Law grants exemption on a portion of industrialized product tax for companies investing in R&D activities and producing computer and telecommunications equipment in Brazil. The Law do Bem was established in 2006 and grants all sectors, except computer and telecommunications, income tax deductions and other tax credits, such as accelerated depreciation on portion of their investments in R&D (Calzolaio and Dathein 2012).

Graph 5.8 shows the evolution in the number of companies benefited from the exemptions and the total tax renounce of these two instruments. As seen, both the number of companies and the total value of the tax



Graph 5.8 Tax exemption and companies benefited by Lei do Bem and the Informatics Law (Data in millions of R$). (Source: Author's elaboration with data from MCTIC)

renounce have increased over the past few years, and the number of companies benefiting from Law do Bem has increased sharply.

Because of these two tax breaks, Brazil occupies an intermediate position in business R&D support via tax incentives. In a 35-country list, Brazil occupies the 19th position (2011 data), with an exemption equivalent to 0.05% GDP.

5.3.5 Public Procurement Mechanisms for Innovation

Another mechanism of public support for innovation still uncommon in the country is public procurement. For a group of authors, such as Edquist et al. (2000), besides providing services, materials, and the equipment necessary for the basic functioning of the state, public procurement can be used to stimulate the technological development of a country.

Broadly, policies based on the use of state purchasing power can be understood as part of the tools defined by Edler (2009) as demand-based innovation policies (DBIPs). The author defines the DBIPs as a set of public measures to increase demand for innovation, improve the conditions for the advent of innovations, or improve the demand in order to encourage innovation and its dissemination.

Several countries have initiatives that prioritize domestic firms in government procurement and many use the tool for technological development. The most emblematic cases come from the US government, particularly the Department of Defense (DoD). Demands from the DoD aimed at strengthening the military apparatus of the United States provided externalities to various branches of the economy, including popular civilian technologies. The development of the internet and the technologies that comprise the iPhone by DoD projects are now widely known cases (Mazzucato 2013).

Although internationally recognized as a key driver for innovation, the instrument is still incipient in Brazil.

However, there are also some government initiatives emerging. The most important is the program of Productive Development Partnerships (PDP) of Ministry of Health. This program can be defined as a partnership involving cooperation between public institutions and private

entities for the development, transfer, and absorption of technological capabilities in strategic products to meet the demands of the Ministry of Health. The Ministry of Health has already articulated at çeast 90 PDPs, resulting in the development of 64 medicines, six vaccines, and estimated savings of R$ 3 billion to the government.

Another recent case of success in using this instrument in the country is the acquisition by the Brazilian military of the KC-390 cargo plane from Embraer. The aircraft prototype was developed under demand of the Air Force of R$ 4.9 billion. However, public procurement for new technologies is still a relatively incipient in Brazil.

5.4 Conclusion

The performance of the Brazilian economy in the past decade was paradoxical: on the one hand, there were relatively high economic growth and an accelerated reduction of social inequalities. On the other, economic productivity had a modest performance compared to other countries and, in the case of the industry, possibly regressed. The competitiveness of Brazilian exports also decreased, in a context of increasing concentration in primary products and reduced complexity.

Several reasons are commonly cited to explain this situation, particularly the slow evolution of infrastructure, the business environment, the level of education ("human capital"), and the innovative performance of Brazilian companies. Without entering in a discussion about the relevance of each variable, we highlighted in this chapter the importance of innovation and tried to indicate through international comparisons that the innovative performance of Brazilian companies is not comparable to the most advanced economies in the world or to more dynamic developing countries like China and South Korea. Accordingly, we assert that the lack of innovation in the business sector is a major contributor to the reduction of productivity and international competitiveness of the Brazilian economy.

At the same time, it should be noted that innovation policy in Brazil has become increasingly complex in recent years. Although the theme still has low relevance in the political agenda of the country, there has

been undeniable progress since the late 1990s. On the one hand, government spending on R&D increased significantly, reaching levels comparable to countries of higher income per capita. On the other hand, there was an effort to improve the regulatory framework and offer different mechanisms to support the private sector. In this sense, it is possible to say that the main instruments to support innovation in the private sector are now present in the national innovation framework.

However, there is no evidence to date, to the best of our knowledge, that these initiatives have been able to significantly affect the overall picture of innovation in the Brazilian private sector. On the one hand, it is possible that other variables have reduced the effect of innovation policies on the private sector, such as the macroeconomic situation, the business environment, infrastructure, and educational performance. On the other, we believe that innovation policies lack the size and the institutional stability necessary for its effects to spread through the production chains of the Brazilian economy.

Indeed, there are indications of discontinuity in policies implemented in recent years, with reductions or more unpredictability in resources for subsided credit, grants, and government procurement programs. International historical experience and recent domestic performance advise Brazil to reverse this situation in the coming years. Otherwise, it might be giving up some of the main mechanisms available to promote competitiveness and finally achieve a sustainable growth rate for the domestic economy.

Notes

1. As forecast by the Central Bank of Brazil, 15/10/2018, available at: http://www.bcb.gov.br/pec/GCI/PORT/readout.asp
2. It is important to have in mind, however, that the quality of Brazilian publications still needs to be improved. Although Brazil is the 14th most published country between 2003 and 2012, the percentage of these publications among the 10% most cited is only 6.7%, a rate similar to China, a country known for the poor quality of its publications.

3. A state-owned company under the Ministry of Science, Technology, Innovation and Communications, focusing on supporting the whole innovation chain, from basic research in universities to innovation projects in companies.
4. A state-owned company under the Ministry of Planning whose main objective is to provide long-term financing for investments in all segments of the economy.
5. The credit instrument has contractual financial costs that are independent of the time taken to develop the technology and its eventual success, and it demands financial guarantees that prevent the sharing of risk between the entrepreneur and lender.
6. National Fund for Scientific and Technological Development (FNDCT), created in 1969, is the main national fund for the financing of scientific and technological research, both in the academic and in the business sectors.
7. Investment forms intended for startups and other smaller firms, where in addition to financial resources the investors contribute with knowledge and networking, among others.
8. In addition to the support for the seed and angel capital industry, two of the venture capital (VC) subcategories, Brazilian Innovation Agency (Finep) and National Bank of Social and Economic Development (BNDES), also supported sharply the structuration of the VC industry in Brazil. To date, for example, Finep has invested in 32 funds of VC, that have invested in 135 companies. BNDES and Finep also invest directly in innovative companies.
9. Law 12,858/2013 removed the main source of revenue for the FNDCT, which was oil royalties. At the same time, expenses unrelated to innovation such as the educational program Science Without Borders have been transferred to FNDCT, further reducing its budget availability.
10. Inspired by the operating model of the Fraunhofer Institutes in Germany, the Embrapii is a social organization under the Ministry of Science, Technology and Innovation (MCTI) that promotes cooperation projects between domestic companies and research institutions, focusing on the pre-comercial phase of the innovation process.

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6

International Trade in Goods by Technological Intensity: The Brazilian Case, 1996–2010

Tulio Chiarini and Ana Lucia Gonçalves da Silva

6.1 Introduction

Trade in goods is a measure that allows for interesting analysis from a macroeconomic perspective. On the one hand, it shows a country's pattern of international trade integration; on the other, it shows, indirectly, the degree of accumulated technological capability that that country has in launching goods in international markets and its level of national dependence on products that feature high levels of high-technological intensity.

In this way, the importation of technologies not produced domestically can serve as a "shortcut" by which to reduce the technological gap. It allows for the implementation, in a relatively faster and less costly manner, of such technologies in internal production processes. Many imported

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technologies, however, are not adapted to suit local realities. Many of them undergo adjustments and see incremental improvements, but this is not always the rule.

The importing country tends to be the locus of an innovation process; however, all externalities generated by the innovation process will be entirely exogenous, if the technology had been developed elsewhere (Aurea and Galvão 1998). Thus, in such cases, the importing country is not directly involved in most of the benefits generated by the innovators (which are located in the exporting countries, where the technologies were created)—even though the importation of technology can result in the relative modernization of a country.

Historical examples corroborate the assertion that various countries have imported technologies (especially up-to-date ones) in an effort to modernize their technological base (Aurea and Galvão 1998). There are cases of laggard countries that were able to catch up to more advanced ones by combining heavy imports of frontier technology with a strong expansion of native efforts devoted to technical change (Dosi et al. 1994). This was the case in South Korea.

The pace of economic growth in a country is strongly influenced by the rhythm of its endogenous innovation activities; that pace can be linked to that country's accumulated technological capabilities, which can in turn benefit from flows of technology and knowledge from abroad. Therefore, under certain circumstances, technology imports and domestic innovative efforts are complementary (Bell and Cassiolato 1993; Dosi et al. 1994; Freeman 1987; Freeman and Soete 2008 [1974]; Hasenclever and Cassiolato 1998; James 1988; Katz 1976; Radosevic 1999).

Technology imports depend inversely on the development level of the importing country's industries. Thus, a country with a solid durable consumer goods industrial sector and capital goods industrial sector will import products with a certain technological intensity—and that intensity will differ from the intensity of the products imported by a country with only a capital goods industrial sector. For this reason, it is possible to assess a country's degree of technological dependence by analyzing its imports.

On the other hand, we can use the exportation of technology as a performance indicator of technological development and, indirectly, the technological capabilities of the exporting country. Moreover, the exportation

process is important to the learning process of local enterprises, through "learn by exporting": the information provided by foreign buyers works as a consultancy device that incurs a relatively low cost while improving production capacity and the quality of the products produced domestically (Radosevic 1999).

At the time of a techno-economic paradigm change, advanced countries can export a wide range of new (and improved) products and services that feature higher returns and lower costs, relative to those of their competitors. However, laggard countries that remain trapped in relatively more obsolete production patterns become less competitive in terms of their technologies, and their exports will consequently lose more and more ground in the world market (Freeman 1987). A gap in design and technology between advanced and laggard countries makes the products of the latter less marketable, or even unsaleable, in foreign markets. Moreover, a gap in technological processes makes their products less competitive in terms of cost. We can thus identify an interdependence between technical-change processes and economic performance (i.e., production and trade) (Dosi et al. 1994). For this reason, the sale of technology indicates the performance of an exporting country in world trade, its accumulated technological knowledge, and its ability to create new products that will be absorbed by foreign markets.

In this study, we undertake an empirical analysis of the Brazilian case in the 1996–2010 period, while focusing on the flow of international trade goods in terms of the technological intensity of the goods of various industrial sectors—that is, high-tech, medium–high-tech, medium–low-tech, and low-tech industries. By exploiting relevant data, we indirectly qualify the international transfer of technology and ascertain not only the suitability of technological industries but also Brazil's level of technological dependence.

This chapter is organized as follows. We start by presenting the data used and the methodological definition of "technological intensity by industry"; we then briefly present the history of Brazil's industrial development process, with the aim of helping the reader understand Brazil's foreign trade flows in the 1996–2010 period. Before proceeding, we make two important caveats. First, by no means does this chapter constitute a comprehensive compendium of Brazil's industrial development process.

Many studies have been conducted that complement the arguments presented in this chapter. Second, any study on such a complex topic must necessarily be limited in scope. We proceed by showing relevant data on international trade in the 1996–2010 period. Finally, we end this chapter by offering final comments.

6.2 The Brazilian Case: Database and Definitions

In this section, we present some exploratory data from Brazil from the 1996–2010 period and analyze the country's imports and exports in terms of their technological intensity. We make use of official secondary data on imports and exports, available from government agencies such as the Brazilian Central Bank (*Banco Central do Brasil* [BCB]) and the Ministry of Development, Industry, and Foreign Trade (*Ministério do Desenvolvimento, Indústria e Comércio* [MDIC]); from private national bodies, such as the Foreign Trade Studies Center Foundation (*Fundação Centro de Estudos do Comércio Exterior* [FUNCEX]); and from international bodies such as the Organisation for Economic Co-operation and Development (OECD) and the World Bank. Those data provide indicators that support the interpretation of historical facts and may contribute to an evaluation, albeit an indirect one, of the process of international technology transfer in Brazil. It is essential to make here an important caveat: while these statistics do not accurately capture the transfer of technology, considered together, they may allow for reflections and insightful interpretations.

The classification of industrial activities according to their technological intensity—as per the OECD's Directorate for Science, Technology, and Industry—deserves more critical analysis, because it is according to that methodology that the MDIC's Foreign Trade Secretariat (*Secretaria de Comércio Exterior*, SECEX) segregated Brazilian exports and imports. The bulk of the analysis in this study is driven by information in this database.

We use the term "technology intensity" to refer to the level of knowledge embedded in the products of companies within each industrial sector; it is calculated according to the methodology proposed by OECD

(2003), while taking into account the spending percentage of production in research and development (R&D) activities. In this way, industrial activities are classified as follows:

i. High-tech industries: aircraft and spacecraft; pharmaceuticals; office, accounting, and computing machinery; radio equipment, TVs, and communications equipment; medical, optical, and precision instruments;
ii. Medium–high-tech industries: machinery and electrical equipment; motor vehicles, trailers, and semi-trailers; chemical products (excluding pharmaceuticals); railroad equipment and transport equipment; machinery and equipment;
iii. Medium–low-tech industries: building and repairing of ships and boats; rubber and plastics products; coke, refined petroleum products, and nuclear fuel; other non-metallic mineral products; basic metals and fabricated metal products; and
iv. Low-tech industries: manufactured products and recycled goods; wood, pulp, paper, paper products, printing, and publishing; food products, beverages, and tobacco; textiles, textile products, leather, and footwear.

The typology proposed by the OECD (2003) has limitations, as it derives from the aggregation of industrial manufacturing activities according to the intensity of the technology allegedly used to launch products to market; it does not take into consideration the degree of innovation inherent in each industrial activity. This typology starts from the premise that technology-intensive companies are more innovative and more efficient, but this cannot be the case if a disaggregated analysis is undertaken. It is perfectly feasible to identify companies as being in high-tech industries and which are not innovative—and, conversely, innovative companies as being in low-tech industries and which are very innovative. In addition, while investments in R&D are important to high-tech activities, they are not necessarily relevant to other industrial activities.

According to Hatzichronoglou (1997) and Zawislak et al. (2013), other factors (e.g., technical and scientific personnel; technology acquired through patents, licenses, and know-how; cooperation and relationships

with other companies) play important roles in assessing the technological intensity of manufacturing companies. For Furtado and Carvalho (2005), the classification proposed by the OECD (2003) should be viewed with caution in less developed countries—like Brazil—due to the historical–structural industrial paradigm seen in these countries, given that high-tech intense activities there occur only in the presence of production facilities and in the absence of the development of technologies and products.

The problems related to the aforementioned typology do not invalidate the relevance of the following survey for Brazil. Rather, this classification allows for fruitful interpretations and draws attention to the lack of technological ability in the Brazilian industrial sector—particularly those industries with high-tech content.

6.3 Brief Historical Background on Brazilian Industrial Development

The engine of Brazilian economic growth in the 1950–1980 period was the industrial sector, which was relatively diversified and integrated. The Brazilian domestic market allowed a relative convergence of Brazil's production structure with those of more developed economies—especially with the growing participation of the metal-mechanical and chemical complexes, two important sectors of the Second Industrial Revolution. However, there has been no effective internalization of innovative capabilities (Sarti and Hiratuka 2010).

In Brazil, the import substitution industrialization (ISI) path leveraged the growth potential of the internal market, and little emphasis was placed on the country's ability to compete globally.[1] The focus on exports was almost always of an emergency nature, with a focus on resolving balance-of-payments problems (Pacheco and Almeida 2013). Such emphasis crystallized in Brazil's industrial culture, so that, to this day, the international integration of Brazil's domestic industry is fragile.

Since the 1950s, Brazilian imports of technology were typically and significantly disconnected from the innovation activities of the companies that imported them (Bell and Cassiolato 1993). Technology efforts

were not directed to the technological frontier but to the adjustment of some technologies to local conditions (Radosevic 1999). As a result, in the context of rapid technological change, imported technologies had little reach in the assimilation process.

Often, when technologies were acquired from outside the country, they were followed by some degree of improvement in process efficiency and product performance and in relatively small adaptations that promoted some learn-by-doing and learn-by-using. The intensity of incremental technical change was inadequate in sustaining international competitiveness in technologically dynamic markets, and so there were no new competitiveness bases in progressively higher-value-added activities (Bell and Cassiolato 1993). In the ISI process, Brazil would acquire product manufacturing licenses or implement new processes, or acquire manufacturing instructions or detailed information on the machines and equipment to be used; they might even access new developments or simple improvements to existing techniques and processes.

Attempts to transfer technology—combined with the market reserve policy through which ISI was conducted (and the resulting lack of foreign competition)—gave way to strong technological inertia, which led domestic companies to rely excessively on license and technical assistance agreements (i.e., technological dependence syndrome). Moreover, a lack of foreign competition has generated little eagerness on the part of Brazil to compete globally; this has curtailed the necessity to innovate constantly, which has ultimately manifested in a weak innovation tradition among Brazilian companies.

Moreover, insufficient attention was paid during the 1950–1980 period to development efforts to effectively master the basics of the engineering process and mechanical engineering (i.e., an important knowledge base for innovation at that time). Such efforts could otherwise have assisted in modifying and better adapting these processes to local needs (Figueiredo 1972) and could also have helped shape Brazil's national system of innovation,[2] which is recognized as immature (Albuquerque 1999).[3]

It is worth mentioning that during Brazil's ISI period, there was no strategy formulated for implementing a clear policy for enacting the social absorption of productive knowledge. In the long term, the consequent process of industrial and technological learning compromised the more

dynamic and higher-quality international insertion of Brazilian companies (Vera-Vassallo 1996). Emphasis was instead placed on the role of state enterprises and public research laboratories. Meanwhile, the domestic private sector was not considered significant to the innovation process; its efforts were limited to the adaptation of products and processes contingent on the importation of machinery and equipment, or on the spillover effects of state-owned or transnational enterprises (Katz 2000).

The focus on "*desarrollo hacia adentro*"—which was supported by the ISI process—had already shown its limits in the mid-1970s; it was completely abandoned in the mid-1980s, when Brazil suffered a strong contraction in aggregate demand and profound structural transformations. These changes derived more from macroeconomic circumstances than from any misconceptions with regard to industrialization strategy (Katz 2005).

Brazil's low innovation performance in the ISI period was due, among other factors, to the excessive importance given to foreign capital (which was assigned the role of increasing the technological capability of the country by supporting product and process innovations brought by transnational companies); it was due also to the low interest of the public sector in transferring R&D results to the private sector (Katz 2000). Therefore, the emphasis on technology imports, in detriment to local development (with the expectation that the growth of transnational participation would result in transfers of technology), failed as technology policy (Erber 2000).

Brazil in the 1980s saw a debt crisis and inflationary issues; the focus of concern throughout this decade, more or less, was monetary stabilization. Brazilian industry has suffered from a relative dearth of modernization and reduced investments, starting in the 1990s. It has tended to adhere to the same profile inherited from the 1970s, when the typical industrial structure of the Second Industrial Revolution came almost fully to the fore (Muniz 2000)—something that stands as the main legacy of the ISI period (Vera-Vassallo 1996). However, any industry that does not invest in growth becomes progressively obsolete, as it does not grow and finds it difficult to assimilate technical progress; from there, it can lose productivity and miss out on new opportunities and new levels of competitiveness (Cano 2012). This is precisely what happened to the Brazilian industrial sector.

The previous situation becomes even more critical when we consider that the Brazilian industry only slightly modernized at a time when the world showed remarkable acceleration in terms of technological development. As a result of this timing, the ISI-period features crystallized within Brazil as a lack of dialogue between public research and the private productive sector. Thus, that period can be seen today in Brazil's outdated capital equipment and assets, obsolete production and management methods, poor business organization procedures compared to those of more developed countries, and a weak relationship between companies and universities/public research institutes.

Given the exhaustion of the ISI model and the eruption of the 1980s crisis, not only Brazil but other Latin American countries were induced to take part in a supposedly neoliberal-inspired development project, supported by the decline of the state and economic deregulation; this allocated to the market the role of driving national development. The 1990s thus marks a break in the Brazilian development model (Coutinho and Belluzzo 1996). Brazilian liberal reformers supported this general and unrestricted liberalization strategy, which was based on the following assumptions (Belluzzo 2012b):

i. price stability would create conditions for long-term economic growth, stimulating private investment;
ii. trade liberalization would discipline domestic producers, forcing them to become more competitive;
iii. privatization and foreign direct investment would remove the supply bottlenecks seen in industry and infrastructure; and
iv. exchange rate liberalization would attract foreign savings on a sufficient scale to complement domestic investment efforts.

6.4 Brazil: 1990s and 2000s

Both globalization and the stabilization policies of the Brazilian economy in the 1990s—especially the appreciation of the exchange rate—resulted in cheaper imports, which affected the competitiveness of Brazilian

exports. According to Carneiro (2002), this macroeconomic scenario pushed transformations in Brazil's productive structure and in Brazil's foreign insertion.

If we accept as accurate the assertion that less developed economies tend to adopt the habits and consumption patterns of more developed economies,[4] we can identify in Brazil from the 1990s an increasingly specialized demand for sophisticated and high-tech goods and services. In the absence of a reaction from Brazil's domestic productive system, such demand ended up being fulfilled by imports—especially given that foreign currency was available and the exchange rate was undervalued. The appearance of this sophisticated demand did not push the more efficient domestic industries to bolster their activities. Excess demand, confirmed by an increase in the import coefficient, was also accompanied by an increasing export coefficient (Fig. 6.1)—something that stemmed from Brazil's trade liberalization process in the 1990s. According to Hiratuka and Negri (2004), the degree to which Brazil's economy has "opened up" has expanded, making the country more vulnerable to changes in global markets. Figure 6.1 shows the increase in both Brazil's export ratio (X/gross domestic product—GDP) (i.e., the relationship between exports and GDP) and its penetration coefficient (M/GDP) (i.e., the ratio of imports to GDP).[5]

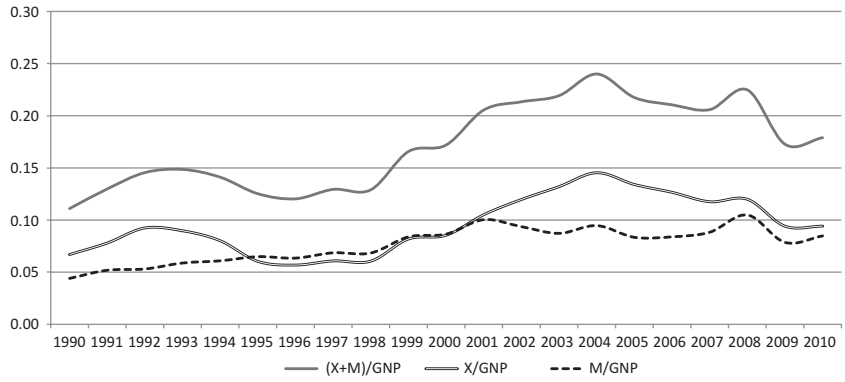

Fig. 6.1 Degree of trade openness (X + M)/GDP and export coefficient (X/GDP) and penetration coefficient (M/GDP), Brazil (1990–2000). (Source: Authors' own. Data compiled by IPEAdata sourced from *Boletim Funcex de Comércio Exterior e do Boletim do Banco Central do Brasil* (BCB Boletim/Ativ. Ec))

The 2000s were also marked by an increase in Brazil's degree of trade openness, relative to the previous decade: the average in the 2000–2010 period was 0.21, whereas that in the 1990–2000 period was 0.14. This performance was achieved by maintaining the macroeconomic policies adopted during the 1990s, which kept the interest rate and the exchange rate "out of place" with a benevolent external environment. As such, the terms of trade between primary and manufactured products favored countries with available natural resources (Belluzzo 2008).

Even with an increase in the total value of Brazilian products exported—namely, USD 31.414 million in 1990, USD 55.119 million in 2000, and USD 201.915 million in 2010—the share of manufactured goods in total exports saw a decline: in 1990, it amounted to 54.15% of the total exports, while in 2010 it dropped to 39.40% (Fig. 6.2). In 1990, of total exports, 27.84% corresponded to commodities, and this share grew to 44.58% in 2010 (i.e., an increase of 16.74 percentage points).

The lack of modernization among Brazil's industries has been identified as stemming from the overprotection of Brazil's industries for an overly long period (as a result of ISI, as already demonstrated). Therefore, the consensus in public discourse from the 1990s was that Brazil's industries should be exposed to more foreign competition, which would push those companies to modernize themselves. The "opening up" of the economy allowed a "tsunami" of imports, and their increased volume put pressure on the market share and profit margins of domestic products (Laplane and Sarti 1997). The growth in predatory imports damaged domestic production and the already-installed industrial sector (Belluzzo 2012b).

In this context, for example, the orientation of the Ministry of Science, Technology, and Innovation (*Ministério da Ciência, Tecnologia e Inovação* [MCTI]) spelled the gradual extinction of protectionism in the microcomputer, microelectronics, and telecommunications industries, and Brazil's government would develop and modernize the country's technological infrastructure (metrology, technical standardization, certification, etc.) and reduce its major R&D projects (Rangel 1995).

Basically, the industrial policies in question were the Brazilian Program of Quality and Productivity (*Programa Brasileiro da Qualidade e Produtividade* [PBQP]) and the Program to Support Industry Technology Skills (*Programa de Apoio à Capacitação Tecnológica da Indústria* [PACTI])

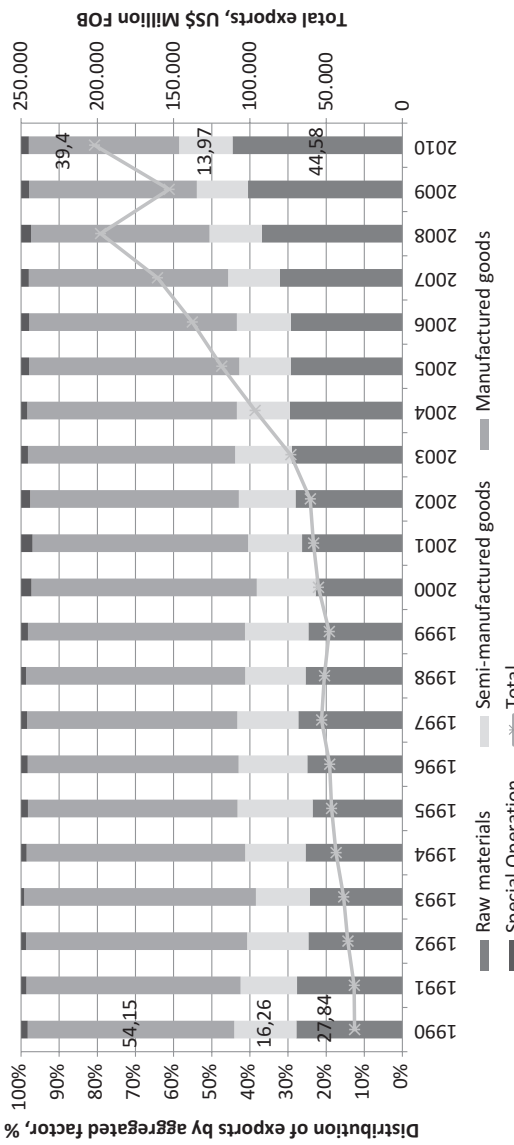

Fig. 6.2 Distribution of exports by aggregate factor, percentage, and total exports, millions of USD (1990–2010). (Source: Authors' own. Data compiled by SECEX/MDIC sourced from *Boletim do Banco Central do Brasil* (BCB Boletim/Ativ. Ec.); Note: values are FOB)

(Matesco and Hasenclever 1998). In addition, to encourage greater private sector participation in expenditures related to innovation activities, the government proposed tax incentives throughout the 1990s.

Following the proposal of the "neoliberal recipe," the 1990s were marked by a paucity of action with regard to innovation policy, with the exception of the creation by the MCTI of the Sectoral Funds, and a call for an innovation law (Koeller 2007). Brazil's government started to articulate a proposal for the creation of an innovation policy, whose aim was to stimulate technological innovation by modernizing regulatory environment; the thinking was that the country's integration in training would focus on innovation and embrace Science and Technology (S&T) policy as a part of strategic development (Chiarini et al. 2014).

From the 2000s, the Lula government[6] initiated various investment projects with a developmental orientation; those projects involved policies that worked to make internal markets more dynamic, support the private sector and investments in the infrastructure sector, and create both social policies and credit policies. In addition, it more broadly started to give greater importance to innovation. There was the creation of the Industrial, Technological, and Foreign Trade Policy (*Política Nacional de Ciência, Tecnologia e Inovação, e da Política Industrial, Tecnológica e de Comércio Exterior* [PITCE]), which preserved the objectives set in the previous period (i.e., the dynamics of innovation and the diffusion of technologies, which were seen as the facilitators of disputes in and the conquest of new markets); thereafter, public policies were equated with the objective of increasing efficiency in economic development and the dissemination of technologies (Koeller 2007).

In May 2008, in the second term of the Lula government, a new program for promoting Brazil's industries was launched, with larger claims in terms of scope, controls, and targets; it also expanded the number of sectors and support tools. This new policy, called the Productive Development Policy (*Política de Desenvolvimento Produtivo* [PDP]), sought to support a long product development cycle, and it would be supported by investment, innovation, competitiveness, and exports (Cano and Silva 2010).

The Greater Brazil Plan (*Plano Brasil Maior* [PBM]), launched in 2011 by the Rousseff government, continued the economic planning of the Lula government (i.e., PITCE and PDP) in order to sustain Brazil's economic

growth; it focused on innovation and Brazil's industrial expansion, through measures such as exemptions for productive investment and exports, credit expansion, and improvements to regulatory innovation. The PBM confirmed that the government held a central role with regard to industry, in promoting the development of the country; it has been linked to some pioneering actions—such as the reduction of taxes on investment and exports—and significant contributions to the Brazilian Innovation Agency (*Financiadora de Estudos e Projetos* [FINEP]) and the Brazilian National Development Bank (*Banco Nacional de Desenvolvimento Econômico e Social* [BNDES]) that would help finance investment and innovation (Almeida 2011). However, Almeida (2011) notes that, even with the measures proposed by way of the PBM, Brazil was still far from being an investment promoter or innovation and export facilitator; even with these measures, it is still unlikely that the country will become more autonomous in terms of technology.

The 2000s, unlike the 1990s (with its international liquidity crises), relied on there being a benevolent external environment, where commodity prices would recover and the external liquidity outbreak would be rectified; the monetary authorities chose to raise the basic interest rate[7] and use the appreciation of the Brazilian real as a tool to combat domestic inflation (Belluzzo 2008). To clarify, over the 2000–2010 period, the exchange rate was quoted, on average, as being BRL 2.29/USD 1 (according to World Bank data[8]). Currency appreciation since the post-1994 stabilization led to the increased importation of raw materials; additionally, the parts and components industry encouraged the sectors most affected by competition from Asia (especially China) to import finished goods and sell them domestically, as if they were national products (Belluzzo 2008)—even as they served as a disincentive to the exportation of Brazilian manufactured goods. Successive valuations in the exchange rate inhibited the formation of expectations conducive to productive investment (whether domestic or foreign), whether they were involved in domestic markets or intended to compete with imports; therefore, currency uncertainties compromised the Brazilian economy's export capacity in the long term (Belluzzo 2008).

While acknowledging the country's economic problems, the shortcomings of Brazil's production base in terms of technological capability

do help explain the weak performance of Brazilian high-tech industry exports, which were supported by lower levels of R&D spending (Melo et al. 2015).

6.5 Brazilian International Trade in Terms of Technology Intensity

A first inference with regard to industrial sectors classified by technology intensity is that the low-tech industries accounted for 43.02% of Brazil's industrial exports in 1996,[9] while only 5.11% of exports were from high-tech industries (Table 6.3, Annex). The top-ranking group accounted for USD 7175.98 million, compared to USD 2041.73 million for the bottom-ranking one (Table 6.4, Annex). In contrast, in 1996, 23.15% of imports were of high-tech products, versus 15.65% of imports being of low-tech products; in monetary terms, those two groups of products were valued at USD 7045.73 million and USD 10,421.98 million, respectively (Table 6.4, Annex).

We can verify, therefore, that in 1996 there was a negative balance in the trade of products from high-tech industries (USD 8380.25 million), and a surplus in trade of products from low-tech industries (USD 10,130.25 million)—that is, in 1996, Brazil was a "debtor of high-tech products."

International trade among industrial sectors in terms of technology intensity saw the same levels of performance across the remainder of the 1990s and the 2000s: the foreign trade of high-tech products remained in a deficit position, with a tendency since the early 2000s for that deficit to grow. Meanwhile, at the same time, the balance of trade of low-tech products remained in a surplus position and tended to grow (Fig. 6.3), thus maintaining Brazil's profile as a debtor of high-tech products.

Brazil's trade of goods and technology services (as a proxy for technology trade) brings with it an undesirable consequence, which materialized mainly by virtue of a permanent trade deficit in technological goods and services (Figs. 6.3 and 6.4). The analytical results show that the increase in the deficit of products featuring high-tech intensity resulted, in part, from the bigger domestic activities that demand these goods; on the other

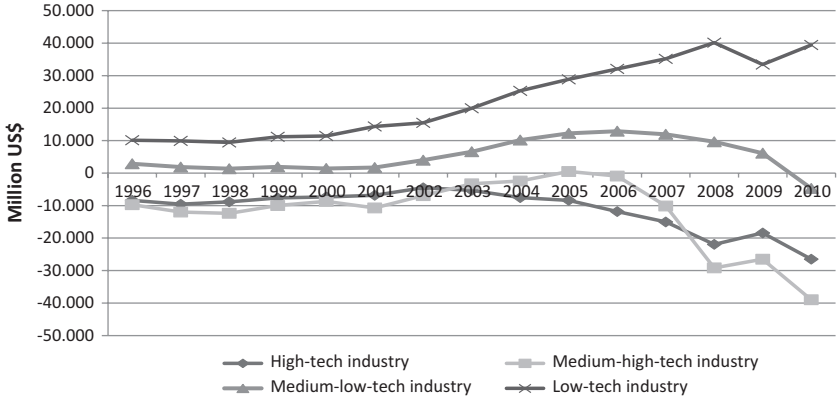

Fig. 6.3 Trade surplus of the industrial sectors by technological intensity, millions of USD (1996–2010). (Source: Authors' own. Data compiled by SECEX/MDIC; Note: values are FOB)

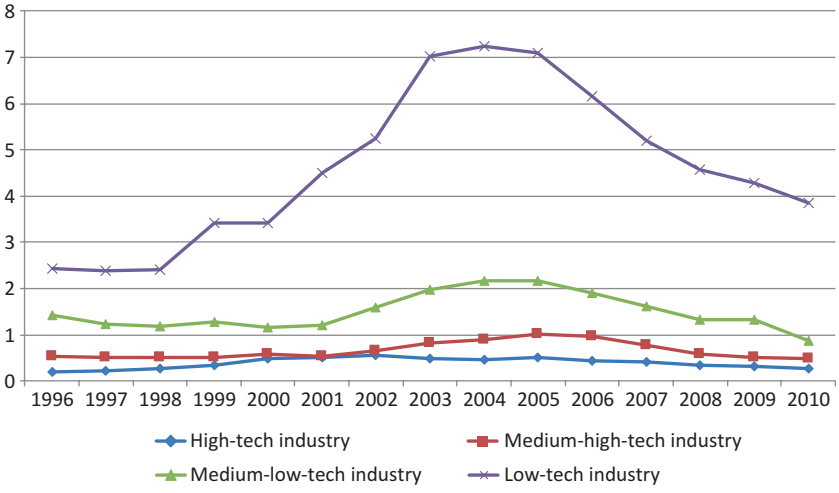

Fig. 6.4 Trade rate (X/M) of industrial sectors by technological intensity, Brazil (1996–2010). (Source: Authors' own. Data compiled by SECEX/MDIC; Note: value FOB)

hand, in terms of products with high levels of high-tech intensity, it also indicates a loss of competitiveness among domestic industries.

Figure 6.4 shows the trade rate (X/M) of the industrial sectors, by technological intensity, for the 1996–2010 period. It should be noted that low-tech industries generated positive and growing current balances until mid-2004, when they went through a "falling down" process—although they still generated surpluses. We must bear in mind that values greater than 1 indicate that the operations create positive trade balances; conversely, values lower than 1 indicate deficits. The export coefficients (X/GDP) of the industrial sectors by technological intensity are shown in Fig. 6.5.

The loss of national industrial competitiveness is seen in both the decline in global economic activity due to the financial crisis (late 2000s) and the de-industrialization process[10] (starting in 1990) due to the lack of appropriate development policies and combination of high interest rates, lack of investment, overvalued exchange rate, and excessive trade liberalization (Cano 2012).

According to Cano (2012), the overvalued exchange rate policy (used as a price anchor to the present day) combined with the practice of high real interest rates (discouraging the capitalist entrepreneur to invest in the

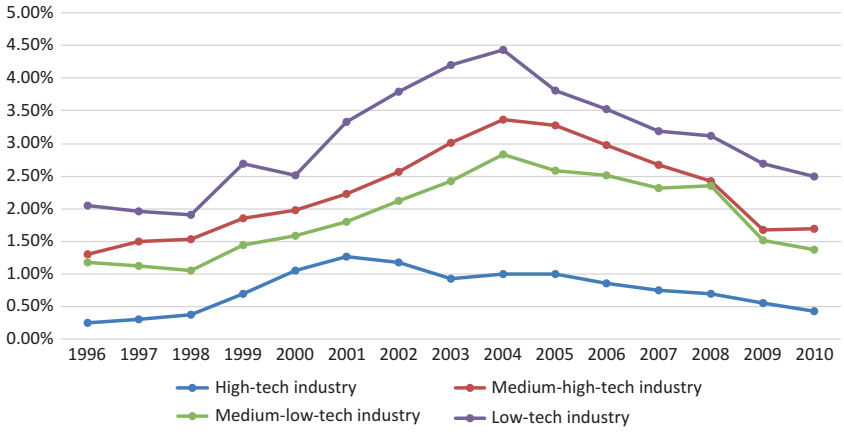

Fig. 6.5 Export coefficient (X/GDP) of industrial sectors by technological intensity, percentage, Brazil (1996–2010). (Source: Authors' own. Data compiled by SECEX/MDIC; Note: values are FOB)

industrial economy, whose expected return is relatively contained compared to the interest rate) and fiscal anchor results in the loss of international competitiveness of Brazilian industry toward other countries.

Moreover, the unregulated opening of the Brazilian economy in the 1990s (with falling tariffs and other protectionist mechanisms of the domestic industry) reduced the degree of protection front to international competition (Cano 2012). An external factor that deserves to be mentioned is the existence of significant barriers to entry for intensive production lines in high-tech products associated with the high R&D intensity and the significant costs involved in organizing production chains.

Moreover, the product markets with high-tech intensity are dominated by the oligopolistic in industrialized countries that do not compete on price but on the basis of quality, design, marketing, branding, and product differentiation. So in this case, the participation in export markets is much more concentrated than in the manufactured goods exported by developing countries (Akyuz 2005).

Returning to the data analysis, Figs. 6.6 and 6.7 show the year-over-year growth rates of exports and imports by Brazil's various industrial sectors, by technology intensity. The average growth of exports (Fig. 6.6) of high-tech industries in the 1997–2010 period was 8.55% per annum, while in the same period, the average growth rate of medium–high-tech, medium–low-tech, and low-tech industries were, respectively, 6.54%, 5.72%, and 7.20% per annum. What is odd is that in the 2008–2010 period (i.e., the period of the financial crisis), the growth rates of these industries were −4.43%, −4.48%, −7.53%, and 5.22% per annum. These rates are lower than those of previous years, on account of a decline in global economic activity; however, despite the fall of the low-tech sector, it continued to grow.

In turn, the growth rates of imports (Fig. 6.7) in the 1997–2010 period, by industry intensity type, were as follows: high-tech, 7.00% per annum; medium–high-tech, 7.10% per annum; medium–low-tech, 7.41% per annum; and low-tech, 2.72% per annum. In the 2008–2010 period, the respective growth rates were 8.66%, 10.78%, 7.00%, and 13.97% per annum. That is to say, Brazil continued to see increasing rates of imports of high-tech-intensity goods, even during the crisis; this could help explain the country's dependence on products with high-tech content and which are not produced domestically.

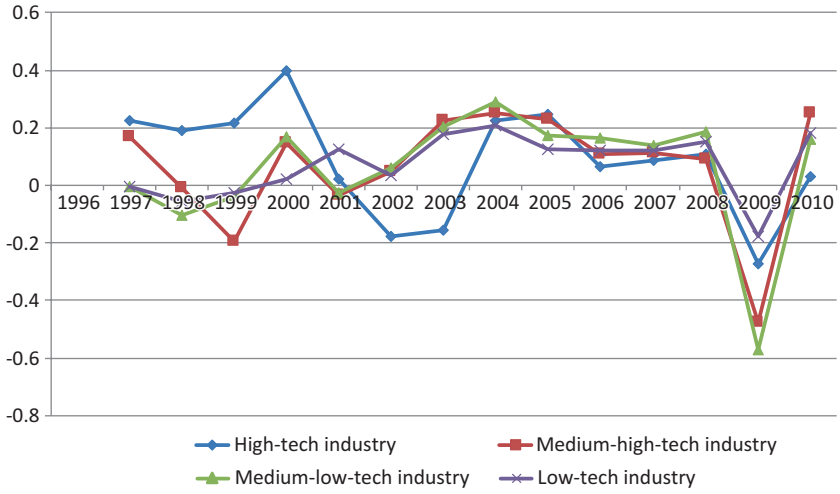

Fig. 6.6 Growth rate (moving average) of Brazilian exports of industrial sectors by technological intensity (1997–2010). (Source: Authors' own. Data compiled by SECEX/MDIC)

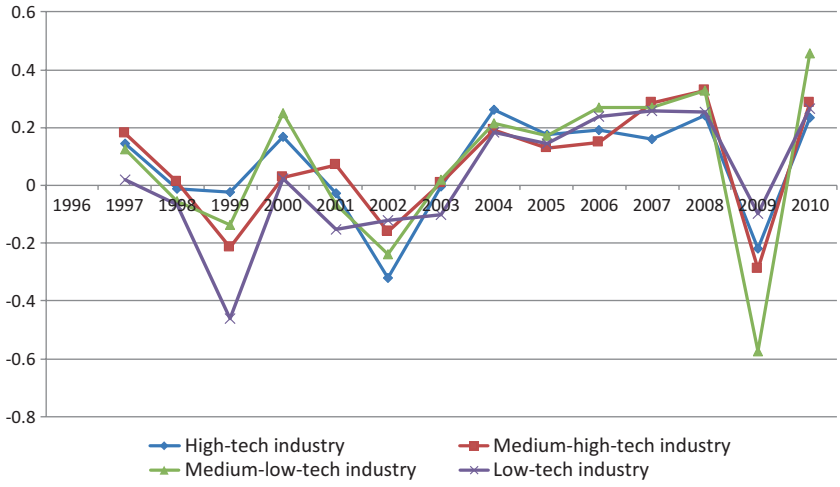

Fig. 6.7 Growth rate (moving average) of Brazilian imports of industrial sectors by technological intensity, 1997–2010. (Source: Authors' own. Data compiled by SECEX/MDIC)

Despite the slight improvement to the high-tech industry's share in Brazilian exports of industrial products (which was 5.11% in 1996 and 7.26% in 2010), performance remained unsatisfactory. Over nearly 15 years, the share of exports of high-tech-intensity products went from 0.24% of GDP in 1996 to 0.43% of GDP in 2010 (Table 6.4, Annex). What we can see from Brazilian foreign trade statistics is that within the export basket, there was an increase in the presence of products with strong high-tech intensity; however, this largely stems from Embraer's activities (Table 6.1).

Industrial products lost their share in Brazilian exports, as shown in Fig. 6.3; we see a high level of dynamism among agricultural and mineral commodities from the mid-2000s (Sarti and Hiratuka 2010; Sarti et al. 2010). Therefore, the recent growth of Brazilian exports is related, on the one hand, to the largest share of commodities in total Brazilian exports and, on the other, to the overall decline in activity, especially since the 2008 crisis (Almeida and Reis 2012).

In 1996, the industrial sector that accounted for most of Brazil's exports of high-tech goods was the "radio equipment, TVs, and communications equipment" (corresponding to 30.50% of exports in this industry); in 2010, it was the "aircraft and spacecraft" sector (corresponding to 50.30% of exports from high-tech industries) (Table 6.5, Annex), characterized by high income elasticity of demand. This resulted in Embraer's good performance internationally.

As can be seen from the data in Table 6.5 (see Annex), the pharmaceutical industry (considered a high-tech industry) had an insignificant level of export performance, marking the country's dependence on foreign industry and making it basically dependent on the importation of active drug ingredients. The pharmaceutical industry has always been in deficit situation (i.e., an average deficit of USD 2755 million in the 1996–2010 period); this indicates the poor performance of this industry, in spite of its recognition as a strategic target by the industrial policies of both the Lula and Rousseff governments.

The low export performance of high-tech industries in Brazil can be attributed to their lack of technological capability. Melo et al. (2015) analyze the Brazilian technological gap, by industrial sector and technological intensity. They show that there is low investment in R&D and innovation

Table 6.1 Exports of the ten largest exporters in Brazil (USD; 2000 and 2010)

2000		USD FOB		2010		USD FOB	
Rank		55,085,595,326	%	Rank		201,915,285,335	%
1	**Embraer S.A.**[a]	**2,701,955,523**	**4.91**	1	Vale S.A.[a]	24,042,781,096	11.91
2	Companhia Vale do Rio Doce[a]	1,596,124,497	2.90	2	Petrobras S.A.[a]	18,186,702,049	9.01
3	Petrobras S.A.[a]	1,456,471,035	2.64	3	Bunge Alimentos S.A.	4,300,622,399	2.13
4	Volkswagen do Brasil Ltda	1,128,862,112	2.05	**4**	**Embraer S.A.**[a]	**4,159,977,026**	**2.06**
5	Bunge Alimentos S.A.	976,931,904	1.77	5	Samarco Mineração S.A.	3,213,635,043	1.59
6	Companhia Siderúrgica de Tubarão	948,792,531	1.72	6	Cargill Agrícola S.A.	3,028,022,863	1.50
7	Fiat Automóveis S.A.	622,635,482	1.13	7	Adm do Brasil Ltda	2,630,964,968	1.30
8	Motorola industrial Ltda	597,183,927	1.08	8	Braskem S.A.[a]	2,470,749,533	1.22
9	Aracruz Celulose S.A.[a]	587,000,104	1.07	9	Sadia S.A.[a]	2,286,365,828	1.13
10	General motors do Brasil Ltda	572,617,141	1.04	10	BRF – Brasil foods S.A.[a]	2,127,147,259	1.05

Source: Authors' own; data compiled by SECEX/MDIC sourced from Boletim do Banco Central do Brasil (BCB Boletim/Ativ. Ec.)
[a]National majority capital

activities within the pharmaceutical industry, as an example. When using information on R&D expenditure/net sales as a proxy for innovation efforts, we derive for the Brazilian pharmaceutical industry an indicator of 3.0%; among some European countries (i.e., Belgium, Denmark, Germany, Spain, France, Italy, the Netherlands, Sweden, and Norway), however, that average is 8.1%. Using data from the Brazilian Innovation Survey (*Pesquisa de Inovação* [PINTEC]) of the "Brazilian Institute of Geography and Statistics" (*Instituto Brasileiro de Geografia e Estatística* [IBGE]), Melo, Fucidji, and Possas also show that only 20% of companies in the Brazilian pharmaceutical sector reported the introduction of either a new product or new processes—that is, they had innovated.

The performance of medium–high-tech industries indicates that the dependence of Brazil in relation to such products was something structural. The trade rate (X/M) for this type of industry has always been in deficit (1996: 0.53; 2010: 0.48). In contrast, both medium–low-tech and low-tech industries saw trade rates greater than 1 throughout the 1996–2010 period (Fig. 6.4).

When plotted, the trade rate of the low-tech industries clearly shows an inverted "U"-shaped curve (Fig. 6.4); this proves a loss of momentum among these industries. We can also see that the medium–low-tech industries previously had this same pattern: they attempted to "take off" in the early 2000s, were unsuccessful in doing so, and reverted to 1990s levels in the late 2000s. Their performance levels are still below 1990s levels. Meanwhile, the medium–low-tech and high-tech industries maintained a pattern of trade rate of less than 1 (Fig. 6.4). It is evident that each industry has its own characteristics and is associated with different levels of opportunities for innovation and different income elasticity of demand (Dosi et al. 1994). Thus, the income elasticity of low-tech products is lower than that of the more technologically intense groups.

To illustrate the increase in Brazilian exports, we show in Table 6.1 Brazil's main exporters. Of the companies that had higher export performance (according to available data), Embraer was the leader in 2000, as its export value accounted for 4.91% of all Brazilian exports. Meanwhile, in 2010, the largest exporter was Vale do Rio Doce, whose export value corresponded to 11.91% of all Brazilian exports. It is no coincidence that a company such as Vale within a mature industry increased its exports.

It is clear that in 2000, only a single majority domestic capital company in Brazil exported manufactured goods with high-tech content (i.e., goods that involve high-tech activities and have high added value). The other national companies in 2000 among the 10 largest exporters in Brazil were in the following order: Vale do Rio Doce, Petrobras, and Aracruz; all are exporters of commodities, and all are in more mature industries whose products feature a relatively lower technological intensity.

While Embraer increased its exports 1.5-fold between 2000 and 2010, Vale increased its exports 15-fold, spurred by rising commodity prices in international markets; in 2010, Vale's exports had a value in excess of USD 24 billion—an amount that represents 11.91% of all Brazilian exports in that year. The other national companies among the 10 largest exporters in Brazil were Braskem (a petrochemical company) and Sadia and BRF (both from the food-processing industry). Brazil's main exports in 2010 were not high-tech products; they were basically mining and processed-food goods.

Looking at the quality of Brazilian exports,[11] we can see that the share of exports of the manufacturing industry in total exports fell steadily between 1996 and 2010, from 84% to 64%. However, medium- and high-tech goods had an almost constant share of the total of exported manufactured goods: in 1996 and 2010, they accounted for 57% and 58%, respectively. The quality index of Brazilian exports also remained virtually constant in those same years (i.e., 0.45 and 0.47, respectively). In comparison, in 2010, this index for South Korea, for example, was 0.95 (UNIDO 2007).

From what we have presented thus far, we can consider that even if there was a significant improvement in the trade statistics of goods and technological services (and therefore the quality index of exports), there would be little argument regarding the endogenous production capacity of technology, as both internal production and technological linkages may have been reduced in amount or number, and the results may have been restricted to foreign trade. For Sarti and Hiratuka (2010) and Sarti et al. (2010), Brazilian exports were not the driving forces of Brazil's industrial structure during the study period, as they were not able to lead economic growth during that time (Table 6.2).

Table 6.2 Quality score for Brazilian exports (1996–2010)

	Share of exports of manufacturing industry in total exports	Share of medium- and high-tech industries in total manufactured products exported	Share of medium–high and high-tech industries in total manufactured products exported	Quality score exports—Type 1[a]	Quality score exports—Type 2[b]
	(A)	(B)	(C)	(D) = [(A) + (B)]/2	(E) = [(A) + (C)]/2
1996	0.84	0.57	0.32	0.45	0.58
1997	0.80	0.60	0.37	0.48	0.59
1998	0.81	0.61	0.39	0.50	0.60
1999	0.82	0.60	0.38	0.49	0.60
2000	0.83	0.65	0.43	0.54	0.63
2001	0.82	0.61	0.40	0.51	0.61
2002	0.81	0.61	0.39	0.50	0.60
2003	0.80	0.60	0.37	0.49	0.59
2004	0.80	0.62	0.37	0.50	0.59
2005	0.79	0.64	0.40	0.52	0.60
2006	0.78	0.64	0.39	0.52	0.58
2007	0.76	0.64	0.38	0.51	0.57
2008	0.72	0.64	0.36	0.50	0.54
2009	0.68	0.58	0.35	0.46	0.52
2010	0.64	0.58	0.36	0.47	0.50

Source: Authors' own, based on data available in Table 6.5, Annex

[a]The quality exports index of Type 1 is derived via the methodology of UNIDO (2007)

[b]The quality exports index of Type 2 goods takes into consideration the share of medium–high-tech and high-tech industries, which is more conservative than that of Type 1 goods

High-tech products and exports are associated with asset domains that can command global value chains. However, as suggested by Sarti and Hiratuka (2010), data pertaining to the foreign trade of high-tech products do not show the country's capacity to capture the value of these products within the global supply chain; rather, these data show only its share in total exports.

From a practical viewpoint, in recent decades, international trade has increased the importance of manufactured goods, especially those based on high-tech content (Mortimore et al. 2001); but even with slight improvements, manufacturers have "lost their place" in favor of commodities.

We can infer, therefore, that the Brazilian economy failed in the last decade of the twentieth century and the first decade of the twenty-first century to (re)configure its industrial production structure according to the standards of the new technological paradigm. It was not able to increase its international competitiveness in the manufacture of high-tech products, and this may indirectly indicate its low-tech-related capabilities. The proportion of Brazilian high-tech exports in terms of world trade is still negligible, accounting for only around 0.50% in 2010 (Fig. 6.8).

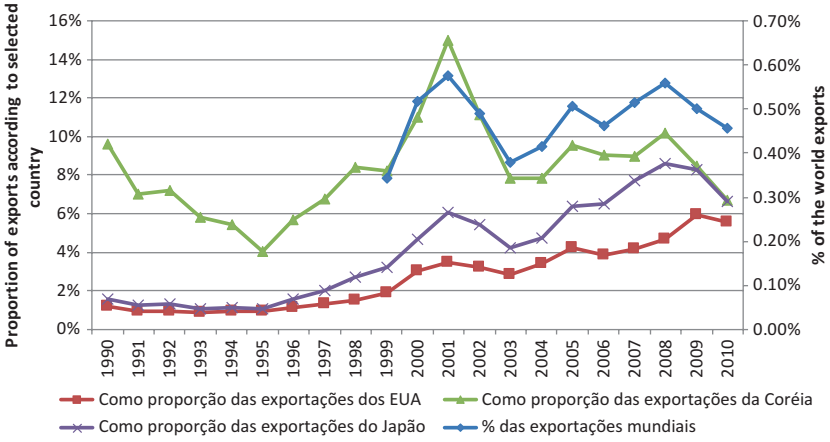

Fig. 6.8 Brazilian exports of high-tech products as a proportion of world exports and those of selected countries (1990–2010). (Source: Authors' own. Data compiled by the World Bank from Comtrade Database (UN))

To illustrate the relatively meager presence of Brazilian exports worldwide, we found that those exports from high-tech industries represent only a small fraction of exports from countries with strong innovation capabilities. In 2010, Brazilian exports with high-tech content represented only 5.58%, 6.65%, and 6.69% of those of the United States, Japan, and South Korea, respectively (Fig. 6.8).

Finally, there is evidence of a recomposition of Brazil's exports profile in favor of products with lower levels of technological intensity—which, strictly speaking, have more limited linkage effects and lower value added. These products are more dependent on the manufacturing imports of middle- and low-income markets, particularly those in Latin America (Belluzzo 2008). The technology that Brazil exports derives largely from the imitation of, or adaptations or improvements to, known technologies, rather than from radical innovation with regard to products or processes.

An important observation can be drawn from the information presented: Brazil has little room for technological opportunities, at least within the new technological paradigm. An industrial structure that incorporates sectors that feature high degrees of technological complexity displays technological and economic dynamics that are superior to those of other sectors, given increased technological opportunities. Thus, we can see that Brazil has always been deficient in terms of trade in goods and services that feature high-tech content and has an industrial structure with a low degree of technological complexity (Chiarini and Silva 2016).

6.6 Final Comments

The growth rate of a country is inextricably linked to the pace of its internal innovation activities (i.e., technological capability), which in turn, under certain conditions, may benefit from flows of technology and knowledge from abroad. To contribute to analyses of the possible relevance of imports and exports in technology and for fostering the learning-transfer process, we explored some data regarding Brazil's international trade.

The Schumpeterian line of thinking understands that innovation requires new markets. Those who set out into the international market—which, by definition, is more competitive than domestic markets—tend to innovate. To export technology-intensive products, a country must

have an innovative industrial structure with technologically advanced sectors and companies that are able to "get out of the bleachers and get into the game," with the help of state-designed policies (Belluzzo 2012a).

Within the current technological paradigm, technological capabilities (which are not generic) can be fostered through: (1) the international community (e.g., information embedded within capital goods, individuals, blueprints, foreign suppliers, foreign buyers, etc.), (2) the national community (e.g., universities, research institutes, other companies, etc.), and (3) the internal efforts of firms (e.g., internal training, R&D, production, etc.) (Kim 2005 [1997]). This study of Brazil's international trade aims to contribute to analyses regarding the possible role of foreign suppliers and buyers as means of promoting—or inhibiting—learning and technological capability.

Although Brazil has increased its openness—as evidenced by the data in Fig. 6.1—the insertion into the world market of Brazilian industrialized exported goods that feature high and medium–high levels of technological content is meager. The country relies, rather, on remarkable specialization in the exportation of products that feature low and medium–low levels of technological content (Chiarini and Silva 2016).

This type of integration can also be seen among Brazil's major domestic exporters, who export low-tech products (e.g., processed food, minerals, etc.); one exception is Embraer. Other major exporters are companies whose majority capital is not national in scope, so even when one considers that their affiliates or subsidiaries are semi-autonomous units, they are still conditioned by the corporate control actions of transnational entities (i.e., they are strongly influenced by financial logic) and the opportunities and constraints perceived within the home environment. They are not as committed to long-term national development strategies as to their own capital-appreciation strategies.

There is a difference in the international insertion profile of Brazil's national companies and that of foreign-funded enterprises. Hiratuka and Negri (2004) came to the conclusion that transnational companies located in Brazil import more high-tech products than do Brazilian companies; thus, transnational companies have a greater volume of imports involving relatively more technological products. This can be explained by the dependence on technology between branches of foreign companies and their respective headquarters (i.e., technology supports the trade

relationship between the subsidiary and the mother company). Moreover, according to Laplane and Negri (2004), transnational companies are more integrated into world trade than are Brazilian domestic companies. Thus, technological trade between headquarters and branches does not necessarily transfer to third parties' relevant knowledge—except through spillover effects on production linkages it has with other companies, wherever they exist.

The discussion of Hiratuka and Negri (2004) may indicate a tendency among transnational corporations to internalize production processes that make extensive use of technology, rather than trade freely in the market. Precisely because they are more integrated into world trade, the branches located in Brazil have greater access to international markets and other advantages, including economies of scale and easier access to credit and new technologies (Laplane and Negri 2004).

With Brazil's advent of trade liberalization since the mid-1980s, it may be noted that, in fact, there has been an expansion in Brazilian foreign trade; this has been discussed here only in terms of the technological content of the goods exported. However, there has been a greater propensity to import products with technological intensity than to export them, and this has had a negative impact on Brazil's trade balance. In other words, Brazil's industries have internally introduced modern technologies, but they have been unable to add more technology to the products produced here—and hence add value—and put them into the international markets (Chiarini and Silva 2016). As a result, Brazil cannot consolidate an industrialization process that results in the exportation of products that feature high-tech content; therefore, many of the exports are still products with low added value. Brazilian exports of manufactured goods featuring high and medium–high levels of technological content are relatively scarce, and from this, we may deduce that the country is still "stuck" at a relatively outdated production level standard.[12]

Brazil has failed to increase its international competitiveness. This has largely been because of its poor integration in dynamic manufacturing (high and medium–high-tech products) in international markets, through either national companies or through participation in international systems of integrated production led by large transnational corporations—the latter of which, in the Brazilian case, have clearly been instituting market-seeking strategies.

Although the importation of technology (as embodied in high-tech products) may constitute an international technology transfer channel, it is effective only if imports are guided toward internal processes of learning and knowledge accumulation. Moreover, not all modes of technology importation contribute to domestic learning: it depends on the way in which technology is linked to complementary factors, including whether the technology can be acquired from other sources, whether its rate of change fluctuates, the degree of development of local technological capabilities, and the implementation of policies that stimulate transfer. In short, it depends on the innovation system that is at work. If the imported technology complements the local technology, it could encourage the expansion of domestic technological capabilities through, for example, learning. Otherwise, the imported technology is a substitute for local technology, and the local capacity to generate technology sustains damage (Fransman 1986). In short, mere importation does not translate into development.

Moreover, imported technology can be used merely as a means of achieving specific measures for increasing competitiveness, by acquiring projects and specifications for new products, equipment, and operational know-how that can be applied to new processes. The host country of that new technology may slow or inhibit the development of similar technologies by local companies, and delay the technological development of the recipient country. In so doing, the host country may produce the so-called technological dependence syndrome, if the domestic technological capability is insufficient.

The physical investment in new machines purchased from abroad must be complemented by intangible investments; hence, for the sake of national development, there is a need for both technology and technological capability transfer policies, as they allow national companies to partake in high-tech activities, within global value chains.

It is worthwhile to mention that, to attain a full understanding of international technology transfers, one should take into account the specificities of each industrial sector. Truly, it is difficult to obtain a comprehensive picture of the true impact of trade in technology goods and services and capital goods, in terms of their impact on economic "catching up" and development.

Another point worth mentioning is the fact that the information and communication technology paradigm is taking into account more and more technologies that are not tangible. Thus, the importation of machinery and equipment lacks several elements, but is becoming more complex, and is acquiring specialized access to external technologies. Therefore, if said "catching up" is to occur, the transfer of technology through the importation of machinery and equipment would, by itself, be insufficient.

On the other hand, the exportation of products featuring high-tech content can be used—albeit inaccurately—as an indicator of the technological domain of a country.

In summary, the analytical use of variables that relate to the international market—the importation and exportation of products that contain high-tech content, for example—can contribute to a better understanding of the dynamic processes inherent in the evolution of competitive advantages among countries. The evolution of such advantages determines whether a country "catches up" or lags behind.

Therefore, considerations of technology imports and domestic technological capabilities are fundamental to any study of the ways in which developing countries can create dynamic competitive advantages in the international market. From the exploratory data presented here, it is clear that Brazil is lagging behind: for some time, it maintained some export momentum by virtue of its commodities, but it has fallen back as an exporter of manufactured goods—especially of high-tech goods.

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Annex

Table 6.3 Percentage share of Brazilian exports and imports of industrial sectors by technological intensity of the total industrial sector, opening coefficient (X/GDP) and penetration coefficient (M/GDP) for technology-intensive industrial sectors (%) (1996–2010)

	X														
Industrial sector	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
High-tech	5.11	6.17	7.86	10.50	14.88	14.62	12.20	8.78	8.57	9.31	8.73	8.40	8.11	8.65	7.26
Medium–high-tech	27.30	30.79	31.49	27.68	27.74	25.80	26.59	28.54	28.90	30.75	30.19	29.96	28.28	26.01	28.28
Medium–low-tech	24.57	22.91	21.46	21.66	22.25	20.91	21.89	22.89	24.43	24.19	25.39	25.92	27.39	23.63	22.92
Low-tech	43.02	40.13	39.19	40.15	35.14	38.67	39.32	39.79	38.09	35.75	35.69	35.72	36.22	41.72	41.54
	M														
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
High-tech	23.15	23.29	23.39	26.87	28.86	28.09	25.73	25.73	27.42	28.19	28.25	25.30	23.35	24.99	22.51
Medium–high-tech	45.82	47.92	49.09	47.57	43.65	46.80	48.88	49.30	47.93	46.76	44.37	46.67	48.39	48.84	47.32
Medium–low-tech	15.37	15.09	14.52	15.05	17.90	16.78	16.41	16.77	16.78	17.25	19.10	19.66	20.41	16.89	21.45
Low-tech	15.65	13.70	13.01	10.50	9.60	8.33	8.98	8.19	7.86	7.81	8.28	8.38	7.84	9.29	8.72
	X/GDP														
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
High-tech	0.24	0.30	0.38	0.70	1.06	1.26	1.18	0.93	1.00	0.99	0.86	0.75	0.70	0.56	0.43
Medium–high-tech	1.30	1.51	1.54	1.85	1.98	2.22	2.56	3.02	3.36	3.28	2.98	2.67	2.43	1.67	1.69
Medium–low-tech	1.17	1.12	1.05	1.45	1.59	1.80	2.11	2.42	2.84	2.58	2.50	2.31	2.35	1.52	1.37
Low-tech	2.04	1.96	1.91	2.69	2.50	3.33	3.79	4.21	4.43	3.81	3.52	3.19	3.11	2.68	2.49
	M/GDP														
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
High-tech	1.24	1.40	1.43	2.01	2.20	2.50	2.07	1.88	2.13	1.94	1.95	1.85	2.03	1.69	1.67
Medium–high-tech	2.45	2.88	3.00	3.55	3.33	4.16	3.94	3.61	3.73	3.22	3.06	3.41	4.20	3.30	3.51
Medium–low-tech	0.82	0.91	0.89	1.12	1.36	1.49	1.32	1.23	1.31	1.19	1.32	1.44	1.77	1.14	1.59
Low-tech	0.84	0.82	0.80	0.78	0.73	0.74	0.72	0.60	0.61	0.54	0.57	0.61	0.68	0.63	0.65

Source: Authors' own; data compiled by SECEX/MDIC and by IPEADATA, sourced from Seção Atividade Econômica do Boletim do Banco Central do Brasil (BCB Boletim/Ativ. Ec.)

Table 6.4 Exports, imports, and trade surplus of industrial sectors by technological intensity (millions of USD, FOB; 1996–2010)

	Exports (X)						
	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
High-tech	2041.73	2627.87	3239.92	4126.47	6838.14	6982.21	5934.79
Medium–high-tech	10,897.44	13,114.88	12,977.42	10,874.36	12,751.05	12,317.31	12,935.03
Medium–low-tech	9807.41	9756.22	8845.56	8511.44	10,226.84	9984.93	10,650.12
Low-tech	17175.98	17,091.10	16,153.92	15,775.44	16,151.82	18,463.97	19,132.34
Total	**39,922.56**	**42,590.08**	**41,216.82**	**39,287.72**	**45,967.85**	**47,748.43**	**48,652.29**
	Imports (M)						
	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
High-tech	10,421.98	12,197.45	12,077.65	11,782.28	14,180.40	13,823.88	10,459.86
Medium–high-tech	20,624.20	25,096.95	25,346.70	20,856.12	21,446.36	23,036.00	19,869.75
Medium–low-tech	6920.09	7902.97	7495.55	6599.25	8793.18	8259.83	6671.38
Low-tech	7045.73	7175.01	6717.50	4604.16	4716.34	4099.16	3651.25
Total	**45,011.99**	**52,372.39**	**51,637.40**	**43,841.81**	**49,136.28**	**49,218.86**	**40,652.24**
	Trade surplus (X – M)						
	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
High-tech	−8380.25	−9569.59	−8837.73	−7655.81	−7342.26	−6841.66	−4525.06
Medium–high-tech	−9726.76	−11,982.07	−12,369.28	−9981.76	−8695.31	−10,718.68	−6934.72
Medium–low-tech	2887.32	1853.25	1350.01	1912.20	1433.66	1725.10	3978.74
Low-tech	10,130.25	9916.09	9436.42	11,171.27	11,435.48	14,364.81	15,481.09
Total	**−5089.44**	**−9782.31**	**−10,420.57**	**−4554.10**	**−3168.43**	**−1470.44**	**8000.05**

Source: Authors' own; data compiled by SECEX/MDIC

2003	2004	2005	2006	2007	2008	2009	2010
5134.90	6610.25	8756.52	9364.25	10,240.76	11,507.01	9048.44	9315.80
16,694.47	22,295.12	28,912.24	32,403.45	36,519.23	40,123.45	27,205.65	36,298.76
13,394.28	18,847.45	22,741.25	27,252.46	31,598.66	38,869.83	24,71.76	29,417.39
23,280.71	29,383.69	33,606.28	38,299.74	43549.23	51,389.45	43,639.32	53,318.18
58,504.36	**77136.51**	**94,016.29**	**107,319.90**	**121,907.88**	**141,889.73**	**104,608.18**	**128,350.14**

2003	2004	2005	2006	2007	2008	2009	2010
10,431.30	14,158.30	17,133.99	21,203.36	25,284.48	33,438.71	27,479.32	35,813.18
19,986.50	24,742.51	28,418.43	33,311.09	46,644.97	69,292.10	53709.57	75,282.07
6799.83	8664.96	10,484.43	14,338.77	19648.66	29,221.44	18,570.61	34,129.21
3319.00	4059.85	4744.15	6215.60	8371.62	11,231.80	10,216.36	13,878.27
40,536.64	**51,625.61**	**60,781.00**	**75,068.81**	**99,949.72**	**143,184.04**	**109,975.86**	**159,102.73**

2003	2004	2005	2006	2007	2008	2009	2010
−5296.40	−7548.05	−8377.48	−11,839.11	−15,043.71	−21,931.70	−18,430.88	−26,497.37
−3292.04	−2447.39	493.81	−907.64	−10,125.74	−29,168.65	−26503.92	−38,983.31
6594.45	10,182.49	12,256.82	12,913.69	11,950.00	9648.38	6144.15	−4711.82
19,961.70	25,323.84	28,862.13	32,084.14	35,177.61	40,157.65	33,422.97	39439.91
17,967.72	**25,510.90**	**33,235.29**	**32,251.09**	**21,958.16**	**−1294.31**	**−5367.68**	**−30,752.60**

Table 6.5 Brazilian exports of industrial sectors by technological intensity (millions of USD, FOB; 1996–2010)

	1996	1997	1998	1999	2000	2001
Industrial products (I + II + III + IV)	39,923	42,590	41,217	39,288	45,968	47,748
High-tech (I)	**2042**	**2628**	**3240**	**4126**	**6838**	**6982**
Aircraft and spacecraft	554	881	1423	1962	3681	3709
Pharmaceuticals	324	392	404	436	403	425
Office, accounting, and computing machinery	354	343	353	472	490	395
Radio equip., TVs, and communications equip.	623	788	788	937	1904	2075
Medical, optical, and precision instruments	187	223	272	321	361	379
Medium–high-tech (II)	**10,897**	**13,115**	**12,977**	**10,874**	**12,751**	**12,317**
Machinery and electrical equipment (n.s.)	841	868	813	766	928	1011
Motor vehicles, trailers, and semi-trailers	3874	5507	5904	4494	5349	5360
Chemical products (except pharmaceuticals)	3013	3234	2995	2779	3331	2851
Railroad equip. and transport equip. (n.s.)	59	58	75	74	117	124
Machinery and equipment (n.s.)	3111	3448	3191	2761	3026	2972
Medium–low-tech (III)	**9807**	**9756**	**8846**	**8511**	**10,227**	**9985**
Building and repairing of ships and boats	186	193	131	12	7	38
Rubber and plastics products	852	916	907	861	955	941
Coke, refined petroleum products, and nuclear fuel	927	971	849	1108	1713	2408
Other non-metallic mineral products	687	769	759	767	852	814
Basic metals and fabricated metal products	7157	6906	6199	5762	6699	5784
Low-tech (IV)	**17,176**	**17,091**	**16,154**	**15,775**	**16,152**	**18,464**
Manufactured products (n.s.) and recycled goods	697	780	719	747	884	906
Wood, pulp, paper, paper products, printing, and publishing	3003	3194	3075	3549	4040	3701
Food products, beverages, and tobacco	9926	9568	9237	8551	7685	10,149
Textiles, textile products, leather, and footwear	3549	3549	3123	2929	3543	3708
Non-industrialized goods	**7824**	**10,404**	**9923**	**8724**	**9118**	**10,474**
Total (Industrial products + non-industrialized products)	**47,747**	**52,994**	**51,140**	**48,011**	**55,086**	**58,223**

Source: Authors' own; data compiled by SECEX/MDIC. n.s. = not specified, or included in another category

2002	2003	2004	2005	2006	2007	2008	2009	2010
48,652	58,504	77,137	94,016	107,320	121,908	141,890	104,608	128,350
5935	**5135**	**6610**	**8757**	**9364**	**10,241**	**11,507**	**9048**	**9316**
2835	2107	3478	3699	3741	5204	6064	4536	4686
440	476	590	725	905	1134	1482	1550	1828
236	271	334	478	496	273	235	203	201
2079	1949	1789	3332	3579	2863	2871	2045	1751
345	332	421	523	643	767	854	714	850
12,935	**16,694**	**22,295**	**28,912**	**32,403**	**36,519**	**40,123**	**27,206**	**36,299**
936	1113	1418	1953	2618	3200	3777	2997	3131
5530	7262	9634	12,992	14,371	15,009	16,293	9351	13,972
3147	3930	4817	5984	6800	8181	8772	7536	9439
130	199	289	560	532	578	496	346	732
3193	4190	6136	7424	8082	9550	10,785	6976	9026
10,650	**13,394**	**18,847**	**22,741**	**27,252**	**31,599**	**38,870**	**24,715**	**29,417**
9	8	1265	194	30	724	1541	119	176
922	1169	1398	1709	2050	2569	2870	2320	2839
2176	2780	3203	4914	6109	7136	9489	5791	6733
937	1129	1502	1775	2114	2288	2080	1522	1818
6605	8307	11,479	14,149	16,949	18,882	22,891	14,963	17,852
19,132	**23,281**	**29,384**	**33,606**	**38,300**	**43,549**	**51,389**	**43,639**	**53,318**
910	1038	1422	1516	1558	1718	1759	1326	1485
3837	4960	6003	6503	7232	8125	8651	6722	8738
10,830	13,188	17,141	20,492	23,967	27,667	35,373	31,737	38,324
3555	4094	4819	5095	5542	6039	5607	3854	4771
11,709	**14,580**	**19,339**	**24,292**	**30,150**	**38,741**	**56,053**	**48,387**	**73,565**
60,362	**73,084**	**96,475**	**118,308**	**137,470**	**160,649**	**197,942**	**152,995**	**201,915**

Notes

1. This is due to the very nature of the import substitution industrialization (ISI) process. The internal development process originates from external constraints that manifest primarily through the expansion and diversification of industrial production capacity (Tavares 1981). According to Tavares (1981, p. 41), "the dynamics of the development process by import substitution route can be attributed, in short, to a series of responses to successive challenges posed by strangulation of the external sector, through which the economy is becoming quantitatively less dependent from abroad and changing qualitatively the nature of this dependence." The ISI model implies the creation of isolated branches that have undergone consistent changes in scale and technology, in the presence of highly protected markets and heavily regulated international transactions. The current policy generally induces passive relationships among these branches (with their supply sources of capital goods, inputs, and technologies), with little coordination with the domestic business sector (Vera-Vassallo 1996).
2. Because "innovation system" is a diffuse and fluid concept, one can find several definitions for it. One characterizes it as an institutional arrangement that involves various constituent elements that interact and are linked to each other. These include (1) firms with research and development (R&D) laboratories and which comprise cooperation and interaction networks, (2) universities and research institutes, (3) educational institutions, (4) a finance system that can support the innovation investment, (5) legal systems, (6) market mechanisms and non-market selection, (7) governments, and (8) coordination mechanisms and institutions (Freeman 1995; Lundvall 1988, 1992; Nelson 1993). With these factors in mind, one can apply them from two different approaches (but in a complementary fashion) to help understand a country's innovation and dynamic development. A more restricted definition equates innovation with science and technology (S&T) and suggests that the use of expertise and performance indicators relates to innovation (i.e., efforts in R&D and S&T). The main indicators proposed in this approach are R&D spending and S&T spending in higher education, the allocation of human resources to R&D and S&T, patents, and scientific publications, inter alia; these are tangible outcomes of the production of knowledge and learning. However, some elements and relationships inherent in an innovation system and which directly affect learning ability are informal

and difficult to measure; this is why the innovation system approach used, from this viewpoint, is broad and includes social institutions, communication infrastructure, education, the types of relationships among agents, and the like (Lundvall et al. 2009).

3. Albuquerque (1999) suggests a typology that differentiates national innovation systems (NISs) according to their level of development: a "mature" NIS is found in developed countries; an "immature" NIS in countries at an intermediate level of development, such as Latin American countries, South Africa, and India; and a "non-existent or rudimentary" NIS in less developed countries. A peculiarity of immature-NIS countries like Brazil is the existence of "partial connections" between scientific infrastructure and technological activities (Albuquerque 1999, 2003).
4. The trend of adopting consumption patterns from core countries in peripheral economies has already been pointed out, for example, by Sunkel (1971), Erber (1972), Fajnzylber (1989), and Furtado (1991, 1998), each of which seeks to show how the gap between the production structure and consumption structure can explain underdevelopment. Thus, consumption patterns in Brazil, which mimic those of more developed countries, involve the importation of foreign technology—technology that is designed for countries where the relative cost of labor is higher—and this prevents the development of technologies that are appropriate to national conditions (Prado 2011).
5. Unlike gross domestic product (GDP), trade flow is measured on a gross rather than an aggregate basis. This analytical method can hide important foreign trade characteristics and a country's true state of international insertion. For example, high-tech products can be said to be exported by developing countries, when those countries may in fact be participating only in their assembly (*maquillas*)—which requires relatively low levels of capability—while using high-tech parts and components imported from more developed countries. Thus, imported parts and components are recorded between exports, where the assembly of the product took place (e.g., in developing countries). Therefore, the analysis of gross figures would suggest that such a country was a "major player" in the global market for dynamic, technology-intensive products, when in fact it is only a mere assembler (Akyuz 2005).
6. Luiz Inácio Lula da Silva from the Workers' Party was the democratically elected president of Brazil for two consecutive terms, from 2003 to 2010. Lula is considered one of the most popular politicians in Brazilian history, and his mandates were famous primarily because of their social

programs. Before Lula, Fernando Henrique Cardoso served for two terms as president of Brazil from 1995 to 2002. Important features of Cardoso's administration were the stabilization of monetary policies and the deepening of privatization. Cardoso is identified with neoliberalism and right-wing politics. Lula supported the candidacy of Dilma Rousseff, who was inaugurated in 2011 as the first female president of Brazil and was reelected for 2015–2018.

7. According to World Bank data, the real interest rate in the 2000–2010 period was, on average, 41.17% per annum. Data are available at http://data.worldbank.org/indicator/FR.INR.RINR?cid=DEC_SS_WBGDataEmail_EXT
8. Official exchange rate data are available at http://data.worldbank.org/indicator/PA.NUS.FCRF?cid=DEC_SS_WBGDataEmail_EXT
9. We chose the year simply by virtue of data availability. MDIC's Foreign Trade Secretariat (SECEX)/Ministry of Development, Industry, and Foreign Trade (*Ministério do Desenvolvimento, Indústria e Comércio* [MDIC]) started using the Organisation for Economic Co-operation and Development's (OECD) methodology for data pertaining to Brazilian foreign trade, making such data available from 1996 onward.
10. The sharp and steady decline of the manufacturing industry's share of GDP marks what is known as "de-industrialization." According to data from Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* [IBGE]) (compiled by IPEADATA), in 1990, the manufacturing industry accounted for 26.54% of Brazil's GDP (year 2000 prices), while in 2000 and 2010 it accounted for 17.22% and 16.23%, respectively. In the 1970–1980 period, the manufacturing industry represented, on average, 32.29% of GDP. There is an extensive debate concerning the causes and consequences of this process, but there is consensus that this process wrought profound impacts, especially from the viewpoint of dismantling and demobilizing important links in some national production chains. This was the result of, or resulted in, increased imports of parts and components among Brazilian industries. According to Cano (2012), de-industrialization in Brazil is occurring as a result of: (1) exchange rate policy that stemmed from the Real Plan, (2) unregulated opening up of the economy in 1989, (3) high interest rates, and (4) increased flows of foreign direct investment. Hiratuka and Sarti (2015) hold a different view in this debate on de-industrialization in Brazil and show that a consideration of a set of competitive, productive,

technological, and financial changes in the global economy helps one understand the de-industrialization process there.

11. The Industrial Export Quality Index, developed by United Nations Industrial Development Organization (UNIDO), is the simple arithmetic average of the share of exports of manufactured goods in total exports and the share of medium- and high-tech goods in total exported manufactured goods. There are caveats to be made: in addition to problems related to the classification of products by technological level, there is the problem of the extent of local value added in export activities. (An exporter that simply gathers high-tech products is captured as being as "sophisticated" as one that designs and produces similar products with local components; indeed, both kinds of companies report the same export figures.) (UNIDO 2007). The intrinsic logic of this index lies in the fact that the share of manufactured goods in total exports captures the role of production in export activities and, more indirectly, technological complexity (i.e., a company's ability to make the most advanced products and move into more dynamic areas of export growth). The share of medium- and high-tech goods in total exported manufactured goods gives a positive weight to relatively complex activities, given that they are desirable for competitive performance: a more complex structure denotes industrial maturity, flexibility, and the ability to move to the fastest-growing activities (UNIDO 2007).
12. By sector, this is not true. There are sectors in which Brazil finds itself at the technological frontier, such as civil aviation; this is represented by the good international performance of Embraer, for example. For that matter, we must once again point out that the innovative process is unique in each sector and each particular firm. Thus, the international transfer of technology is also unique for each sector and each firm.

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7

On the "Latin American Decade"

José Antonio Ocampo, Eduardo F. Bastian, and Marcos Reis

7.1 Introduction

Latin America (LA) got significant attention in the recent past thanks to its good economic performance. Some authors claimed that the first decade of the 2000s—or at least part of it—were *golden years* for LA. Others suggested that the 2010s were going to be the *Latin American decade*.[1]

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Were these analyses overoptimistic? Do the data corroborate this hypothesis of a golden period or a Latin American decade? This chapter comparatively evaluates LA's recent performance based on a series of economic statistics, namely gross domestic product (GDP) growth, unemployment, inflation rates, poverty ratios, current account balance (% of GDP), and the net external debt (as % of both GDP and exports). It firstly compares LA's performance in the period 2003–2013 with its own results in the 1980s and 1990s. It then splits the period 2003–2013 in two sub-periods: (1) the pre-North Atlantic crisis[2] years 2003–2007; and (2) the crisis and postcrisis 2008–2013 period. Statistics of both subperiods are then compared with LA's own performance in the 1980s and the 1990s.

Finally, LA's performance in the period 2003–2013 is compared with the results of other developing areas within the same period. In particular, LA's[3] performance is compared with the following regions, whose composition are indicated in Annex: (1) Emerging and Developing Asia (EDA), (2) Middle East and North Africa (MENA), (3) Sub-Saharan Africa (SSA), and (4) the Commonwealth of Independent States (CIS). They will be identified hereafter by their acronyms.

The chapter is divided into five sections, including the Introduction and the Conclusions. The second section briefly summarizes the literature that presented and discussed this idea of the 2010s as an LA's decade and/or the first decade of the 2000s as a golden period for LA. The third section compares the period 2003–2013 and the sub-periods 2003–2007 and 2008–2013 with LA's own performance throughout the 1980s and the 1990s. The fourth section consists of the comparison of LA with other developing areas during the period 2003–2013.

7.2 The Idea of a Latin American Decade: A Summary

In the 1960s and the 1970s, LA grew at an average of 5.5% a year.[4] However, during the "Lost Decade" of the 1980s, most countries in the region suffered from a combination of debt crisis, very high inflation rates, and very modest economic growth rates. During the 1990s, macro-

economic stabilization was back but growth rates remained modest in general. Moreover, some important countries of the region experienced currency crisis in the second half of that decade.

During the 2000s, and particularly since 2003, Latin American countries faced a very positive external context. (For simplicity, we would refer to the period 2003–2013 as the "2000s".) Firstly, commodity prices went up. As Fig. 7.1 shows, there was a commodity price boom during the 2000s. The CRB index first increased by 152.0% between 2003 and 2008.[5] After a fall during the North-Atlantic crisis, it reached another peak in 2011. Although the index fell in 2012–2013, its 2013 level was still around the 2008 peak and thus much above the levels of the early 2000s.

As most countries in the region (and particularly in South America) are commodity exporters, LA benefited from this rise in commodity prices. More specifically, the commodity prices boom translated into significant terms of trade increases for the region from 2003 onward (see Fig. 7.2). Apart from the 2009 crisis period, terms of trade increased continuously from 2003 to 2011.

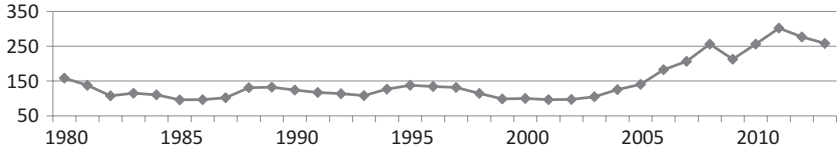

Fig. 7.1 Index of commodity prices (2000 = 100). (Source: Authors' elaboration based on data from the UNCTAD)

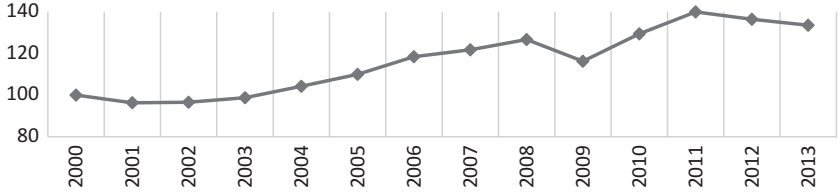

Fig. 7.2 Evolution of index of terms of trade in LAC (2000 = 100). (Source: Authors' elaboration based on data from the UNCTAD)

It is important to note that this spike in commodities prices—and hence the improvement of terms of trade—can be attributed, among other things, to the impressive growth of China over the last decade.[6] However, the "Chinese miracle" did not affect the countries in the region in the same way. For Mexico, Chinese manufacturing competition in the US market led the country to remain below the LA average growth during the 2000s. Since the entry of China in the WTO, some authors argued that Mexico could be one of the countries that would be negatively affected.[7] Utar and Torres Ruiz (2013) analyzed the effects of the Mexican-Chinese competition in the US market. Using data from 1990 to 2006, their empirical analysis reveals a substantial effect of intensified Chinese competition on the Mexican *maquiladoras.*

Moreover, the 2000s were also a period of abundant international liquidity. LA also benefited from this fact, as reflected in capital inflows (see Fig. 7.3). Net direct investment flows were positive throughout the 2000s. Net portfolio investment flows turned positive from 2007 on. Both kept positive even during the peak of the North-Atlantic financial crisis (2008–2009).

The countries of the region did not miss the opportunity provided by such a positive external scenario and experienced a growth upsurge during the 2000s. In most cases, growth acceleration was followed by poverty reduction, better income distribution, and low inflation rates. This process led to a growing enthusiasm with LA, based on which part of the press, multilateral institutions, and think tanks started to talk of a "Latin American decade."

According to the *Financial Times* and *The Economist*, the label "Latin American decade" was first proposed in 2010 by Sir Martin Sorrell, a

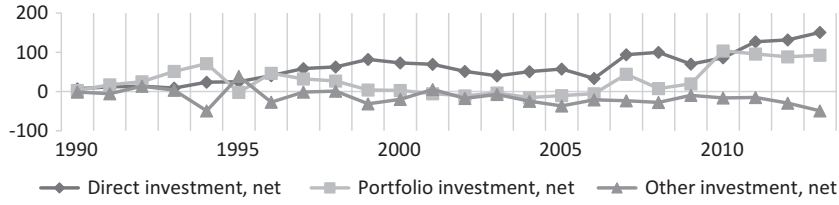

Fig. 7.3 LAC's net capital flows (US$ billions). (Source: Authors' elaboration based on data from the IMF)

British adman. His idea was that the 2010s were going to be the decade of LA.[8] Following this idea, *The Economist* made a special report on the region in September 2010. The special report's articles pointed out some problems—like slow productivity growth—and the need of further reforms.[9] However, the tone was mostly positive.

The most important endorsement of the idea of a Latin American decade was perhaps that made by the President of the Inter-American Development Bank, Luis Alberto Moreno. In a 2011 report of 161 pages, Moreno argued that there were plenty of improvements in the region throughout the 2000s and that there were several reasons for optimism for the 2010s. He stressed many times that the Latin American decade was not a certainty and that it would only be achieved with good policies. However, he strongly believed that there was a real window of opportunity for this Latin American decade to become a reality and that the continent was prepared for the challenge.

On the one hand, there were internal reasons for optimism. For instance, macroeconomic policies and banking and fiscal institutions were sounder than in the past, meaning that the region was better prepared to face crises (Moreno 2011: XIII–XVI; 147). On the other hand, the external sector prospects also seemed to be favorable. It was believed that the world demand for natural resources and commodity prices would stay at high levels. Hence, as the region is an important commodity exporter, this meant a positive external scenario (Moreno 2011: XVI; 34; 147).

A slightly optimistic position was also defended by Cárdenas (2011). He affirmed that it was still an open question whether LA would waste or benefit from the then favorable context. Nevertheless, he also believed—as his article's title suggests—that the 2010s were a *once in a lifetime opportunity for LA*. Firstly, he pointed to a demographic opportunity thanks to the decline in the dependency ratio until the 2020s. Secondly, he believed that the favorable external scenario of high commodity prices and low interest rates in the US would last for a few more years, giving the region countries a further chance to adjust their economies before the scenario changed. These adjustments meant, for instance, increasing savings and investments in human capital and R&D.

However, it is worth noticing that some analysts always remained skeptical about the chances of a Latin American decade in the 2010s. For instance, Velasco (2011) argued that the favorable external scenario was the most important factor for the region's good performance. Similar euphoria periods happened in the past during favorable external contexts, but they ended in crisis when the scenario reverted. In this regard, he was concerned about the way fiscal policy was being managed during the growth years.

Ocampo (2012) also pointed out that the external scenario was the most important driver of LA's economic growth in the 2000s. In this context, he believed that the good external conditions were almost over, especially taking into account that world trade was losing the dynamism and the upward phase of the commodities *super-cycle* seemed to have reached its peak. More importantly, he argued that—among other things—a model which could foster economic growth would have to focus on productive sector strategies aimed at promoting technological upgrading but that this had not been the case under the orthodox export-led growth model Latin American countries adopted since the 1990s.

In fact, the external scenario started to change possibly sooner than what was expected by almost everyone. In 2012–2013, China's economy slowed down and commodity—particularly non-oil—prices started to decline. As most of the Latin American countries started to decelerate during this period, the chances of a Latin American decade got more and more unlikely. A growing sense of pessimism regarding LA has thus been spreading among the press and academia since then.[10]

In the wake of harder times, there was a new way of discussing the idea of a Latin American decade. As the good prospects for the 2010s vanished, it became clearer that the so-called Latin American decade had been perhaps the first decade of the 2000s. Talvi and Munyo (2013) seemed to suggest this point. They named the period from the third quarter of 2003 to the third quarter of 2008 as the *Golden Years* of LA. During this pre-Lehman crisis period, the seven largest Latin American economies[11] (LA-7) grew at an average rate of 6.6%. By contrast, they named the 2012–2013 decelerating period as *Cooling-Off* (Talvi and Munyo 2013: 1; 4–5).

More recently, Talvi (2014) suggested a slightly different version. He divided the 2004–2014 period into two sub-periods: (1) 2004–2011, a phase in which LA-7 grew 6.1% per year on average (excluding the financial crisis interruption) and (2) the cooling-off period that started in 2012 (Talvi 2014). However, both in Talvi and Munyo (2013) and in Talvi (2014), they argued that the 2010s were far from being brilliant and the very good performance period consisted of the years before the 2010s, be it just the pre-Lehman crisis period (2003: III–2008: III) or the 2004–2011 period. We suggest another division for this chapter: 2003–2007 and 2008–2013. This division is close to the one proposed in Talvi and Munyo (2013) and thus different than the one proposed in Talvi (2014). We believe that using 2008 as the breakdown is the best option because the 2008–2013 period was mostly of slow economic growth. There was high growth in 2010 but only after a strong slowdown in 2008–2009 (even a recession in some countries), with a new slowdown already starting in 2011. The next sections will analyze LA's performance during the pre-North-Atlantic financial crisis and the more recent period.

7.3 Latin America's Performance over the Last Decades

This section will use only data from Latin America and the Caribbean (LAC) countries and aims to: (1) compare the recent period (2003–2013) with the Lost Decade (1980–89) and what we will call the Neoliberal Era (1990–2002) and (2) present the indicators for the current decade but also divide it into two sub-periods, 2003–2007 and 2008–2013. In terms of the data, we will use GDP growth, the unemployment rate, inflation, and poverty ratios as performance indicators. Besides, due to the importance of the external sector, we also use two indicators of external vulnerability: the current account balance (% of GDP) and the net external debt (as both % of GDP and of exports).

We divided the recent decade into two sub-periods due to the North-Atlantic financial crisis that started in mid-2007 with the subprime crisis in the US and became severe after the collapse of Lehman Brothers in

September 2008. Even though the crisis was originated in the developed countries, LA and other emerging markets also suffered its consequences. Hence, it is interesting to split the last decade in two sub-periods: (1) before the beginning of the crisis (2003–2007) and (2) after the outbreak of the crisis (2008–2013).

We analyze the region's performance in selected indicators when compared to its record during the previous two decades and similarly evaluate the last decade by dividing it into the two identified sub-periods. We conclude that the region presents better indicators over the past ten years when compared to the previous two periods. Meanwhile, the first half of the last decade presents, in general, better indicators than the aftermath of the North-Atlantic crisis, especially when it comes to the GDP growth rate and external sector indicators.

We start the analysis with the two most common macroeconomic indicators: annual GDP growth rate and the inflation rate. Table 7.1 presents the relevant information. The most recent period shows a robust increase in GDP growth, which almost doubles that achieved during the Lost Decade and exceeds substantially that of the Neoliberal Era. In addition, population growth decreased significantly from the 1980s to the present: from over 2% per year in the 1980s to 1.2% during 2003–2013. Hence, when analyzed in per capita terms, GDP growth exhibited an even more positive result in the 2000s.

Regarding the two sub-periods within the last decade, the table shows that the first sub-period (2003–2007) showed the best performance. The average growth in the sub-periods was 4.9% and 3.1%, respectively. This represents a significant decline in growth. Indeed, if we compare the second sub-period of the recent decade with average growth during the

Table 7.1 GDP growth and inflation (average for the period)

Period/Indicator	GDP growth	Inflation
1980–1989	2.1%	138%
1990–2002	2.6%	103%
2003–2013	3.9%	6.8%
2003–2007	4.9%	6.9%
2008–2013	3.1%	6.7%

Source: Authors' elaboration based on data from the IMF

Neoliberal Era, there is only a small increase, while the first sub-period almost doubles the growth rate achieved at that time.

Inflation, one of the main problems of the first two decades of the sample, remained under control during the recent period. The first and second periods experienced average inflation of 138% and 103%, respectively. It is noteworthy that between 1985 and 1995 the index experienced an enormous peak and reached almost 500% in 1990. In contrast, during the most recent period (2003–2013), the average inflation was 6.8%.

The poverty ratio is the indicator that presents the most remarkable performance during the last decade. Among the many existent poverty measures, we opted to use the World Bank's indicator poverty headcount ratio at US$ 2 a day Purchasing Power Parity (PPP) (% of the population). The basic advantage of this indicator is that it can be used for international comparisons, as it is available not only for LA but also for the other developing regions; the comparison among them will be presented in the next section. As we will see below, a similar story can be described with the alternative indicator of the poverty headcount ratio of the United Nations Economic Commission for Latin America and the Caribbean (ECLAC/CEPAL)

As Table 7.2 shows, the poverty ratio indicator remains around 22% during the Neoliberal Era.[12] In less than a decade, in 2010—the last year with data available—this number declined to 10.4%. In other words, the region experienced a stunning decrease in the poverty ratio by over half in only eight years.

Regarding the two sub-periods, the region was successful in diminishing the index in both of them. Unfortunately, for the second sub-period

Table 7.2 Poverty ratio and unemployment (average and percentage change in the period)

Period/Indicator	Poverty ratio	Unemployment[b]
	See note 11	–
1990–2002	21.8% (−1.7%)	9.7% (+49%)
2003–2013	15.5% (−54%)[a]	8.5% (−45%)
2003–2007	19.4% (−1.8% PY)	9.2% (−35%)
2008–2013	11.2% (−1% PY)[a]	7.0% (−15%)

Source: Authors' elaboration based on data from the World Bank and the IMF
[a]2010 is the last available data
[b]There is no unemployment indicator for the region before 1991

there are data only for three years. From 2002 to 2007, the ratio declined by 1.8 percentage points per year. Meanwhile, from 2008 to 2010 the decrease was only of one percentage point per year. This indicates that even though the region kept improving after the crisis, the pace was a much slower one.

In terms of unemployment, there are only data for 1991–2013. The average unemployment rate for the 2000s was only slightly below that of the Neoliberal Era, but there are significant variations in the trends during both periods. While in the 1990s the unemployment rate increased, the indicator experienced a sharp drop during the most recent period. Table 7.2 presents the average for the periods and in parentheses the change experienced during the periods (difference from the last and first years of the sample).

Looking at the two identified sub-periods, unemployment rate continued to decline during the second, though at a slower pace. Due to the high initial levels inherited from the Neoliberal Era, the average for the first sub-period is 9.2%, but it declines to 7.0% during the second. Despite a small spike in 2009, due to the impacts of the North-Atlantic financial crisis that brought the unemployment from 7.3% in the previous year to 8.1%, there is no other year where unemployment rose. However, as indicated, the pace of improvement of employment decreased significantly after the crisis.

As pointed before, we used the poverty indicator that allowed us to compare LA with other regions. Alternatively, ECLAC[13] provides its own estimates for the regions' poverty and extreme poverty. In Table 7.3, we

Table 7.3 Poverty ratio and unemployment (selected years)

Period/Indicator	Poverty ratio	Extreme poverty	Unemployment
1980	40.5%	18.6%	–
1986	43.3%	20.7%	–
1990	48.4%	22.6%	7.5%
1994	45.8%	20.9%	8.4%
1999	43.8%	18.6%	11.2%
2005	39.7%	15.4%	9.0%
2009	32.9%	13.0%	8.1%
2013	28.1%	11.7%	6.2%

Source: Authors' elaboration based on data from the ECLAC (poverty) and the World Bank (unemployment)

Table 7.4 External indicators (average for the period)

Period/Indicator	Current account (% of GDP)	External debt (% of GDP)	External debt (% of exports)
1980–1989	−1.9%	43%	323%
1990–2002	−2.2%	36%	235%
2003–2013	−0.4%	28%	126%
2003–2007	0.8%	31%	135%
2008–2013	−1.5%	25%	118%

Source: Authors' elaboration based on data from the IMF

present the data—together with unemployment data from the World Bank—for selected years. It can be noted that the region experienced a peak in both poverty and extreme poverty in 1990, at the end of the Lost Decade. During the following decade, the indicators remained at a very high level—with unemployment peaking in 1999—and then started to decrease when LA started to recover in 2002–2003, achieving its best observations in the last available year, 2013.

Table 7.4 presents the external sector indicators. The current account balance presents a negative result in all periods. In the first two, it reached −1.9% and −2.2% of GDP, respectively. The 2000s were better but not good enough to present a positive result (−0.4%). Hence, even in a period with a very strong increase in the terms of trade (Fig. 7.2), the region could not keep the current account positive, making it dependent on external capital flows.

The difference is clear, however, when the two sub-periods of the 2000s are differentiated. The averages are 0.8% and −1.5%, respectively. Therefore, while during the first sub-period the indicator was positive, it became negative during the second sub-period and not far from that observed in previous decades.

We use two different indicators for the foreign debt: external debt as a percentage of both GDP and exports. The external debt declined significantly according to both measures. The average for the three periods were 43%, 36%, and 28%, respectively, for the exports as a percentage of GDP, and 323%, 235%, and 126% when estimated as a percentage of exports.

There was a slight improvement from the first sub-period for the second. The external debt as a percentage of exports dropped from 135% to 118%, whereas the external debt as a percentage of GDP fell from 31%

to 25%. However, in both cases the lowest point of the series is 2008. After that, the series starts to rise again.

In conclusion, the region experienced a positive decade in the selected indicators. In terms of GDP growth, the decade was significantly better than the previous ones and the inflation rate, unlike the past two periods, remained under control.

Unemployment levels and the poverty ratio were the indicators that showed the best performance. There has been a downward trajectory in unemployment rates since 2003—from 11.2% to 6.2% in 2013—that continued even after the North-Atlantic financial crisis. In turn, the poverty rate decreased by over half during the 2000s, whereas it had remained quite stable during the Neoliberal Era and had increased during the Lost Decade, according to ECLAC in the latter case.

Looking at the two sub-periods, GDP growth performance declined significantly during the second sub-period, though inflation remained stable. Unemployment and poverty continued to decrease during the second sub-period, but the pace of improvement slowed down significantly, indicating the effects of the growth slowdown experienced after the North-Atlantic financial crisis.

The current account balance result for the last decade was negative but considerably better than in the other periods, and the external debt decreased significantly. Breaking down the 2000s, the current account displayed a positive result during the first sub-period but a negative one during the second. And although the external debt averages were better in the second sub-period, they started to increase right after the crisis and remained in an upward trajectory during the entire second sub-period, indicating a negative trend.

7.4 Developing Regions' Performance During the Last Decade

The previous section brought us two main conclusions. The record of LA during 2003–2013 was much better than during the previous two decades. However, when this decade is divided into two sub-decades, it is

clear that there is a noticeable worsening of economic conditions in the aftermath of the North-Atlantic crisis, indicating that the Golden Years were behind.

To answer the questions posed in the introduction to this chapter, we must not only look at the data for LA but also compare them with other emerging/developing regions over the past decade. This section compares, therefore, the performance of LAC using the same indicators analyzed previously but this time for four other developing regions. The objective is to analyze if the past decade was good for LAC relative to other regions or if the positive indicators exhibited by the region was only part of a phenomenon that took place in all emerging/developing regions.

Looking only at the data for LAC—as in the last section—would be misleading because we would be missing the bigger picture. Analyzing other developing regions' performance allows us then to figure out if the last decade was good for all emerging markets and not especially for LA. Additionally, it makes possible to evaluate if LAC underperformed within the group of developing regions.

In this regard, Velasco (2013) has pointed out how the well-known development economist Carlos Diaz-Alejandro remarked in the 1970s that the combination of high commodity prices, low international interest rates, and abundant international liquidity would amount to economic nirvana for developing countries.

This was exactly the conjuncture experienced by the emerging markets during the period 2003–2013. The very low interest rates in the developed countries also allowed the emerging economies to experience lower rates and primarily to benefit from the inflow of capital looking for better returns. Besides, as indicated in Sect. 7.2, commodity prices showed a significant improvement during the decade. Hence, all the elements in the dreamed "nirvana" described by Diaz-Alejandro were present, so that the external context was favorable not only to LAC but also to other emerging/developing regions.

Turning back to the indicators, we found some limitations in the international databases for some of the regions. Specifically, the data on unemployment and poverty ratio were incomplete for some countries. In order to make them comparable between the regions, we weighted the numbers by population in the countries to construct regional averages with available data.

As Fig. 7.4 shows, in terms of economic growth, the analyzed decade was splendid for the emerging countries. In decreasing order, the GDP average growth for the decade was very good in all regions: EDA (8.4%), SSA (6.1%), MENA (5.4%), CIS (5.0%), and LAC (3.9%).

Arguably, LAC's performance was far from remarkable. The region presented less than half of the average GDP growth of the EDA region and almost a fourth less than the penultimate in the list, the CIS. Hence, at least in the growth perspective, the decade was relatively bad for LAC since all the other developing regions exhibited significantly higher growth rates.

Regarding inflation, Table 7.5 shows that LAC presented the second best result: 6.8%, right after EDA's 4.8%. All the other three regions

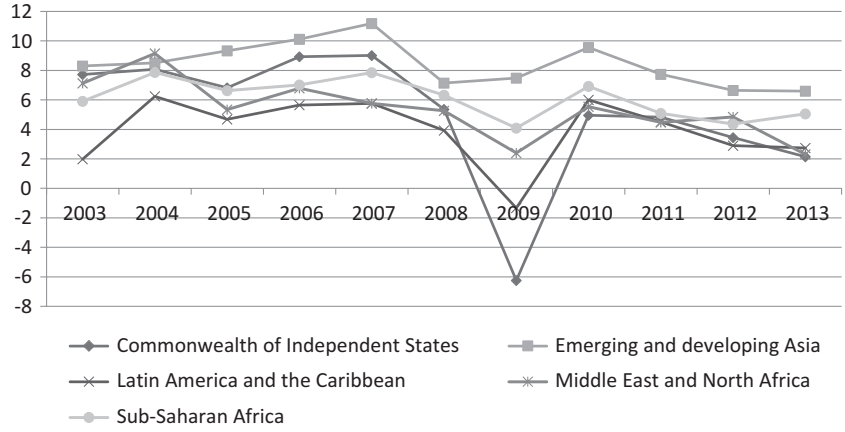

Fig. 7.4 GDP growth (2003–2013). (Source: Authors' elaboration based on data from the IMF)

Table 7.5 Inflation, unemployment, and poverty ratio for developing regions (2003–2013)

Region/ Indicator	Inflation (average)	Unemployment (average and % change in the decade)	Poverty ratio (2005 and 2011)
CIS	10%	7.3% (–33%)	3.4%/1.3%
EDA	4.8%	4.9% (–16%)	38.4%/22.7%
LAC	6.8%	7.8% (–42%)	15.2%/9.28%
MENA	8%	11.3% (–15%)	17.2%/11.6%
SSA	8.9%	–	74.5%/69.5%

Source: Authors' elaboration based on data from IMF and World Bank

showed results above 8%, with CIS being the highest. This indicates that in terms of price stability, the region achieved an excellent result.

Table 7.5 also shows data for unemployment. Unfortunately, there were no sufficient data to construct an index for SSA. LAC was the region that most successfully reduced unemployment rates, from 10.5% in 2003 to almost half of that level in 2013, 6.1%. However, all the regions experienced a decrease in this indicator. EDA experienced the lowest decrease, but this reflects the fact that the initial rate was already very low, and the region succeeded in keeping the lowest unemployment rate among all developing regions during the whole period. CIS presented a considerable decrease, from 8.9% to 6.1%, while MENA also diminished its rates in about two percentage points, from 13.0% to 11.0%.

Regarding the poverty ratio, we used the same indicator as in previous section, the percentage of population living on less than US$ 2 per day. Unfortunately, there were no sufficient data for many countries. Based on available data, EDA was the most successful region in decreasing the poverty rate, from 38% in 2005 to 22.7% in 2011, the last year for which there are available estimates. This success must be directly linked to the incredible pace of growth presented by the region during this period. The CIS maintained the lowest poverty ratio among all regions. In the meanwhile, LAC and EDA diminished by almost 40% and MENA by 33%. The outlier was SSA with only a small reduction. As indicated above, the lack of data for some countries may have biased the estimates.

Looking now at the external sector, Fig. 7.5 shows that the boom in the commodity prices experienced over the decade was very favorable for the developing regions that are rich in natural resources. MENA and CIS, areas with high reserves of oil and gas obtained superb current account balances: 11.2% and 4.8% of GDP, respectively. EDA kept substantial positive results (3.3%), even though lacking the natural resources in abundance like other emerging peers. In contrast, SSA and LAC were not capable of achieving positive outcomes despite the terms of the trade boom. The first presented an average of −0.1% of GDP while LAC showed the worst indicator, −0.4%.

Regarding the external debt, Fig. 7.6 shows that all regions—except for the CIS—succeeded in diminishing their external debt as a percentage of exports during the decade. While LAC, EDA, and MENA successfully

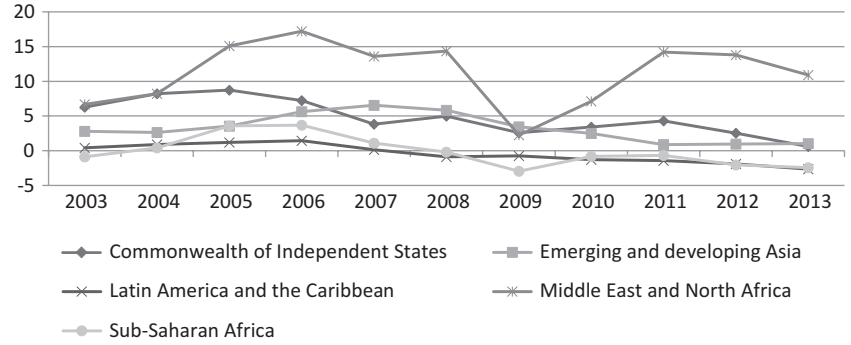

Fig. 7.5 Current account balance (% of GDP). (Source: Authors' elaboration based on data from the IMF)

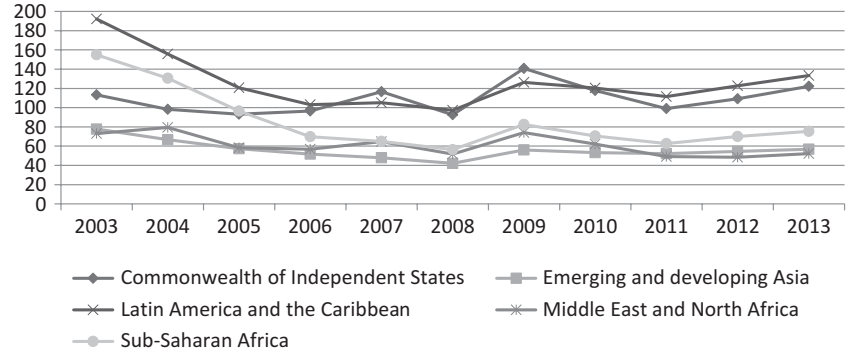

Fig. 7.6 External debt (% of exports). (Source: Authors' elaboration based on data from the IMF)

reduced the indicator by about a third, SSA did it by more than half, largely because it benefitted from the debt write-offs agreed under the Highly Indebted Poor Countries (HIPC) Initiative. LAC remained, however, as the region with the highest debt ratio (133%) of the sample.

When measured as a percentage of GDP, the evolution of external debt presents somewhat different results. Again, all the regions were successful in diminishing the debt ratio. The pace, however, was not the same. Again, SSA was the most successful region, with a decline of over half. LAC and EDA diminished its ratio by around a third while the other two

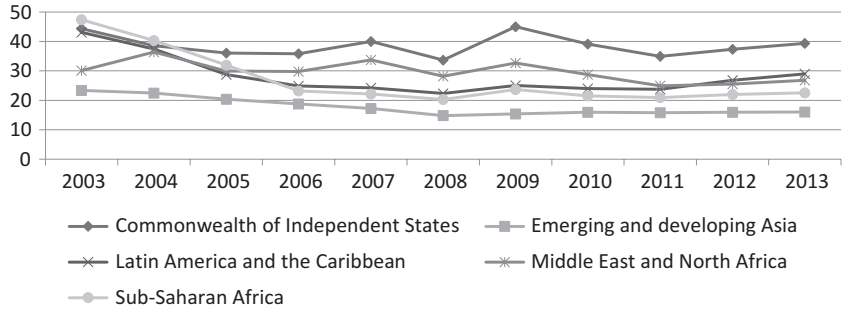

Fig. 7.7 External debt (% of GDP). (Source: Authors' elaboration based on data from the IMF)

regions did it only by a tenth. In terms of average for the period, the order is: CIS (38%), MENA (29%), LAC (28%), SSA (27%), and EDA (17%).

Figure 7.7 shows how the emerging markets increased or decreased their external debt during the period as a percentage of their GDP. In sum, it can be concluded that, in terms of economic performance over the last decade, LA certainly did not excel when compared with other emerging/developing regions. When it comes to economic growth, it had the worst result. On average, it experienced less than half the growth rate of EDA and remained more than one percentage point below the region with the second worst record, the CIS.

Regarding inflation, LAC's result was good, being the second best among the five regions. However, the indicator was relatively low in all regions despite a small peak during the 2008 food crisis that led to a two-digit inflation in some. On the other hand, LAC showed remarkable indicators in terms of reducing unemployment rates, presenting the highest drop in this critical variable among the four regions analyzed.

The poverty rate decreased in all the regions from 2005 to 2011. Unfortunately, there is a lack of observations for many countries. Nevertheless, our analysis showed that CIS's poverty levels remained very low and at decreasing rates, while LAC and EDA reduced their poverty rates by two-fifths. It is interesting to note that LAC was highly successful in reducing the poverty ratio despite the fact that it experienced the worst GDP growth rate of all regions.

Finally, in the current account balance, LAC presented again the worst performance among all regions. Only two regions of the sample showed a negative average during the decade that was marked by a boom in the prices of commodities: SSA and LAC, with LAC exhibiting the worst results. LAC was successful in reducing the external debt ratios, both as a proportion of GDP and exports, but it remained the region with the highest external debt as a share of exports and with the second-highest external debt ratio as a proportion of GDP. Therefore, LAC had an overall poor external sector performance when compared to other developing regions during the period analyzed.

7.5 Concluding Remarks

LA got much attention in the recent past thanks to its excellent economic performance. Some authors claimed that the first decade of the 2000s—or at least part of it—was a golden period for Latin American countries. Others suggested that the 2010s were going to be LA's decade. The chapter aimed to discuss if these visions were overoptimistic or if the region did indeed experience an outstanding period.

Section 7.2 explored the concept of a "Latin American Decade." It showed that the region experienced over the last decade a very significant increase in the terms of trade generated by a commodity price boom. Moreover, the capital flows to Latin America presented a sharp boost. This led some authors to state that the region was about to experience or was already living through an outstanding decade. However, this was not a consensus, and other authors disagreed with this vision and argued that the golden years might end, as in the past, with a crisis.

Section 7.3 analyzed LAC indicators over the last decade and compared them with the region's past record. It concluded that the past ten years were outstanding for LA when compared with the two previous periods: the Lost Decade and the Neoliberal Era. However, a closer look at the recent decade brought some interesting conclusions. When we made a division between two sub-periods and observed economic performance before and after the 2008 North-Atlantic financial crisis, the results for the latter were disappointing. The GDP growth was lower, the

external results much worse, and the pace of improvements in poverty and unemployment slowed down significantly, indicating that the boom years were already in the past.

Finally, Sect. 7.4 compared LAC's performance over the last decade with other emerging/developing regions. Instead of overperforming over other regions as expected, if we stick to the *Golden Years* vision, the region underperformed in almost all indicators, experiencing in particular the worst performance in terms of GDP growth and external sector variables among all five regions. However, LAC did very well in terms of unemployment, being the region that achieved the higher reduction and presented a slightly above-average result regarding the poverty ratio.

Hence, the analysis of the data showed that it is true that the region experienced a good decade when compared to the previous two ones. However, its best performance was achieved in the five years that preceded the 2008 North-Atlantic financial crisis, after which performance worsened and the rate of improvement of several indicators slowed down significantly. Moreover, when compared to other developing regions, LA's performance was poorer in most indicators.

In other words, the period 2003–2013 was a Latin American decade only when compared with the region's own past. Furthermore, these "Golden years" did not even last a decade, since they were concentrated in the 2003–2007 sub-period. The less favorable external context for the upcoming years, which was already evident in 2014, also undermine the hypothesis that the 2011–2020 period could be the "Latin American Decade." Therefore, we conclude that there is indication of a Latin American Decade neither in the recent past nor in the current decade.[14]

Annex: Composition of Groups

Commonwealth of Independent States

Composed of 12 countries: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

Emerging and Developing Asia

Composed of 29 countries: Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Fiji, India, Indonesia, Kiribati, Lao P.D.R., Malaysia, Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Nepal, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, and Vietnam.

Latin America and the Caribbean

Composed of 32 countries: Antigua and Barbuda, Argentina, The Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, and Venezuela.

Middle East and North Africa

Composed of 20 countries: Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, United Arab Emirates, and Yemen.

Sub-Saharan Africa

Composed of 45 countries: Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Republic of Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, South Africa, South Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, and Zimbabwe.

Notes

1. See, for instance, Talvi and Munyo (2013) for the idea of a golden period in the first decade of the 2000s. For the idea of a Latin American decade in the 2010s, see Moreno (2011). Both works will be discussed in Sect. 7.2.
2. Although the 2008–2009 financial crisis had global effects, it concentrated in North America and Western Europe. Hence, the term *North-Atlantic financial crisis* is more appropriate than the most commonly used one of *global financial crisis.*
3. We generally use the acronym LA to refer to Latin America, but some statistics relate to the Caribbean –and hence the use of the acronym LAC, to include the latter. Given the relative size of the Caribbean, the statistics for LAC tend to be fairly similar to those for LA.
4. In the 1960s, LAC grew at an average rate of 5.4% and in the 1970s at 5.6% (Moreno 2011: 20).
5. Erten and Ocampo (2013) argue that there were four commodity *super-cycles* of around 30–40 years for the period 1865–2010. They suggest that the fourth super-cycle started precisely in the early 2000s and is still going on, now in its downward phase.
6. Yu (2011), for instance, analyzed how the composition of growth in China, particularly high investment rates that support industrialization and urbanization, have contributed to a large and growing demand for commodities over the last decade.
7. Dussel (2005).
8. See Rathbone (2013), and *Nobody's Backyard*, The Economist, September 9th 2010.
9. See, for instance, the articles: *A Latin America Decade?*; and *So Near and Yet so Far, The Economist*, September 9th 2010.
10. See, for instance, Rathbone (2013) and Rathbone (2014).
11. Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela.
12. We eliminated from Table 7.2 the World Bank estimates for the 1980s, as they showed a decline of poverty in the midst of the Latin American debt crisis. In contrast, the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) numbers shown in Table 7.3 indicate a significant increase in poverty during that decade.
13. Differently from the World Bank and other official indicators that are defined in terms of dollar value, identical for all countries in terms of

purchasing power parity, the ECLAC's index considers each countries' specific "food basket" and respects the prevailing consumption structures (United Nations 2010).

14. The chapter did not intend to discuss why the region underperformed other emerging markets, especially regarding the gross domestic product (GDP) growth and the external sector. Future works can explore this subject. In addition, it is important to note that we work with aggregate data. In this way, some countries will be more representative in the sample than others will. In LAC, this is clearly the case for Brazil and Mexico. According to data from 2013, these countries together are responsible for 52% of the population and 57% of the GDP of the region. Future works can also explore this point and analyze the results within the region.

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8

A Comparative Analysis of Brazilian and Chinese Economic Performances from 1995 to 2016

Fernando Ferrari-Filho and Anthony Spanakos

8.1 Introduction

In October 2003, a Goldman and Sachs report (Wilson and Purushothaman 2003) argued that global convergence trends augured well for certain large emerging markets and that these would soon displace traditional European economies and, in one case, even Japan and the United States, in terms of market size by the year 2050. These countries, namely Brazil, Russia, India, and China (known by the acronym BRIC), were likely to offer some of the best investment opportunities in the coming decades.

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In 2009, the heads of state of the BRICS met in their first summit and have met annually since then (BRICS with South Africa joining in 2011). Once a concept limited to market professionals, the term has been adopted by politicians in these countries as well as media pundits, all of whom raise the question of the countries playing a greater role in global governance (Armijo 2007; Spanakos 2012). Critics are clear to point to the very significant differences between the countries, particularly China whose GDP is roughly one-quarter larger than that of the other four countries combined (Chin 2014, p. 371). What is of greatest concern here is not the impact on global governance of any one or all of the BRICS (see Spanakos and Marques 2014) but why there is such diversity in growth outcomes among the members of the BRICS. Between 2000 and 2016, the annual average GDP growth rates were as follows: Brazil's was 2.3%, Russia's was 3.8%, India's was 6.6%, China's was 9.0% and South Africa's was 2.7%.[1]

Why were there such diverse outcomes over such a period? Obviously, the countries involved are quite different in a number of categories (size, openness to the global economy, and political system) but grouping them on the basis of their growth and as increasingly important emerging economies gives reason to consider them comparatively. This chapter responds to the diversity of outcomes by focusing on the best- and worst-performing BRICS in terms of GDP growth, respectively China and Brazil, over the period and argues that the selection of macroeconomic policies when the countries became increasingly engaged in global commerce contributed to significantly different outcomes in terms of production. Specifically, Chinese approaches toward monetary and exchange rate policies led to more consistent and robust GDP growth than has been witnessed in Brazil, even when the 'boom' years of 2003–2008 are considered. Moreover, unlike Brazil, the Chinese model based on a state-led growth, structural transformation, and intensive technology was important to build a robust global strategy in the 1990s and 2000s. Thus, Chinese growth has been both a part of generalized growth and a very substantial convergence, whereas Brazilian growth has continued earlier start-stop trajectories.

To answer this question, the chapter is divided into four sections. Section 8.1 establishes the basis for comparison between China and Brazil by contextualizing these countries within the BRICS[2] concept. Section 8.2 aims to present a partial explanation why economic reforms do not necessarily boost economic growth. Something approaching a consensus now exists over the lack of effectiveness of universally applicable holistic reform programs. Section 8.3 presents a comparative analysis of Brazilian and Chinese economies focusing on the issue of macroeconomic policy, especially monetary and exchange rate regimes, and their effect on economic growth.[3] The idea is to show that the inflation targeting regime (ITR) and flexible exchange rate regime adopted by the Brazilian government, since 1999, has contributed to slow start-stop growth alongside moderate inflation, while the more managed approaches of exchange rate and monetary regimes favored by China has led to stronger growth and lower inflation. The period analyzed includes the period of the commodities boom (2003–2008) as well as the response to the 2007–2008 financial crisis and its aftermath. Finally, the chapter concludes that, in light of the Chinese experience, countercyclical economic policies and capital controls can assure sustainable economic growth in the developing countries.

8.2 Some Differences and Similarities Among the BRICS Countries

In many aspects, such as historical legacies, culture, and regime type, to name but a few, there is little to bind the BRICS countries (Chin 2014). In the area of economic policy reform, however, there are certain important similarities though they produce varied results. This analysis of economic policy reform can be considered an interesting case of most similar analysis (Gerring 2007, Chap. 5). Most similar case analysis approaches are well positioned to explore causal mechanisms that may be obscured in studies with high numbers of cases, "large N studies" (George and Bennett 2005). This is particularly important because of the indeterminacy that 'large N studies' (see the next section) show in terms of liberalization and growth in general (Hausmann and Rodríguez 2014).

State intervention was considerable in all four economies until the 1980s (Brazil and China) or 1990s (Russia and India), and all have moved considerably in favor of freeing market actors and reducing the role of the state, though state involvement in the economy and a prevailing idea of 'development' never disappeared from government policy discussions (for Brazil see Montero 2014, and for China see Lin 2012, 2013). The governments in each of these countries entered the post-World War II period with a very clear awareness of a need to catch up and a belief that governments should either actively fill market gaps or that they should wholesale collectivized productive activity. Post-War policies involved state-led growth through ambitious multi-year industrialization plans with considerable variety in degrees of success. All pursued policies that were decidedly inward in orientation, and Brazil, India, and China, displayed little interest in trade, save traditional sectors which were increasingly disadvantaged by macroeconomic policies. The Soviet Union economy, while more global in orientation, understood its trade profile as part of a larger context of Communist solidarity, and its trade was determined by political motivations more so than by traditional concerns of price, productivity, and quality. Thus, while the Soviet Union was engaged in trade, it did so through the Council of Mutual Economic Assistance, a relatively closed association.

In addition to being relatively closed economies, credit had been cheaply provided through the extensive presence of government in credit markets. Public development banks (Brazil, India, and China) or government monopolies in banking (USSR) directed low-cost capital to sectors favored by government plans. While planning was more significant and effective in the USSR and India than in China[4] and Brazil, in all cases, private financial markets were 'repressed' (Beim and Calomiris 2000). The rise in global interest rates, sharp fall in oil prices, and global consumption in the early 1980s exposed many structural weaknesses in the models pursued by all four countries. Particularly, varying mixtures of increased indebtedness to external creditors, rising inflation, food and goods shortages, and persistent fiscal deficits plagued Brazil, the USSR, and India, while China suffered from rising inflation and heavy state and quasi-state debt. A perception that domestic market processes had been exhausted, inability to access viable external credit markets, and external

shocks leading to crises in the four countries encouraged all of these governments to pursue reforms, prescribed by economists and policy makers, related to the trade and financial liberalizations, labor, social security, capital mobility, and foreign exchange markets.

The BRICS countries differed in the speed, pace, and content of the reforms that they implemented, as well as the amount of pressure they endured from international financial institutions and trading partners. Nevertheless, all moved toward liberalizing their economies to degrees unknown by any of those countries for much of the twentieth century. Importantly, all moved toward transforming state-owned enterprises into private or mixed partnerships whose performance would be determined by market rather than political conditions, increasing the role of domestic and foreign (China to a lesser extent) participation in capital markets, flexibilizing labor contracts and rights, and welcoming foreign and domestic private investment, particularly in industries once considered sensitive or part of national security (again, China to a much lesser extent).

Given these similarities, what is telling is the stark difference in economic growth over the last decade. More specifically, given that the explanation of the growth of China and India is normally understood as the result of liberalization, it is important to address why liberalization did not have the same effect in Brazil and Russia (in the 1990s).[5]

8.3 Economic Reforms à la Washington Consensus and Economic Growth

Liberalization was thought to be the remedy to the stagflation of the 1980s. Stagflation was a problem in developed countries but it was devastating in developing countries where growth shocks were more pronounced, inflation rates higher, citizens had fewer savings, and governments had currencies which were ineffective stores of value. The need to resume economic growth was, thus, more pressing in developing countries but the usual small-scale reforms seemed inadequate to solve egregious levels of price instability, deteriorating currency value, and slow or negative growth.

Policymakers centered in Washington and many US-trained technocrats in developing countries believed that structural reforms which would liberalize markets and rationalize the state activity were necessary as this would reduce inflation and allow growth to return. Though it has been severely vilified in retrospect, the Washington Consensus (WC) was primarily an attempt to show the consensus among economists about the need to correct structural weaknesses and restore growth (Williamson 1990, 2002). Thus, in a context of increasing consensus around liberal ideas, economists and policymakers spoke of getting the (macroeconomic) 'fundamentals' correct or getting prices 'right'. In such an environment, the WC quickly moved from ten policies ('Ten Commandments') which emerge from a sum of cumulative wisdom of the discipline of economics to a complete set of rules to be followed closely and in tandem.[6]

Problems emerged relatively rapidly because although economists 'knew' that these prescriptions were correct, evidence was weak and, sometimes, contradictory. Stallings and Peres (2000) found that some reforms had positive effects on growth and inequality, whereas others did not. This led to debates about the importance of sequencing, with authors arguing that certain reforms needed to be done before others. Political scientists and economists pointed to the absence of attention to institutions and argued that rule of law, a competent judiciary, governability, and other issues were necessary for economic transitions (Haggard and Webb 1994). Such institutional reforms were considered 'complementary' and part of a 'second generation'. These reforms were more difficult because they involved more political maneuvering and implementing governments required more political support in order to sustain such changes. Finally, another debate emerged, based largely on comparative analyses of the experiences of the People's Republic of China and the former Soviet Union Bloc countries about the virtue of 'shock therapy' versus gradual reform (Nolan 1995; Aslund 2002; Hui 2005).

Interestingly, most proponents in the various debates believed that reforms were good, necessary, and applicable in all cases. The problem lay in timing, political will, or passing additional reforms to make the first set work more efficiently. The crisis in Asia in 1997 began to chip away at that perspective. For instance, Rodrik (1998) led the charge against blind support of liberalism and globalization, arguing that particular policy approaches might work better than a dogmatic set of policies. Particularly

challenging to liberals, though somewhat overstated, was the importance played by capital controls in the Malaysian response and recovery (Haggard 2000). The collapse of Argentina in 2001 was particularly traumatic because the stylized impression was that Argentina had been a 'poster child' of the WC and if it—and its convertibility system—was dead and buried, so should 'neoliberalism' (Blustein 2006).

Stiglitz (2002) unleashed a number of critiques of the WC. Thus, he suggested a number of reforms, a 'post-WC', which were more likely to produce sustainable and equitable development. In one reflective piece, Williamson (2002) replied by recognizing that on certain policies he may have overstated the amount of consensus among economists, but he largely stood by the ten principles he initially laid out. What is rather remarkable is that not only Williamson, but many of his critics, believed that one particular set of reforms will bring about growth although evidence increasingly suggested otherwise. They disagreed on which reforms and the pace and sequencing, but there is a considerable amount of faith in reform agendas writ large. Particularly exemplary of such faith-based economics can be found in Williamson's reflections on the WC ten years later (Rodríguez 2006).

And yet, the path to growth does not seem to be paved with one set of reform policies. That is, according to Sindzingre (2005), stabilization and adjustment programs and economic reforms do not effect growth and the income of developing countries. In their study of reforms in Latin America, Stallings and Peres (2000) found that reforms lacked perfect complementarity and that financial liberalization often had negative effects. Similarly, using a larger data set, Eichengreen and Leblang (2002) and Rodrik (1998) show that it is difficult to establish a robust relationship between financial liberalization and economic growth performance for developed and, especially, emerging countries. Examining all regions from 1975 to 2000, Rodríguez (2006) argues that the data correlating openness and economic growth are very inconclusive. Stiglitz (2010) shows that financial and capital market liberalization were among the *causes* of the financial and exchange rate crises in East Asia and Latin America at the end of the 1990s.

This is not to say that reforms have no effect on growth, only that the relationship is more complex than conventional wisdom suggests. In the case of the BRICS countries, the evidence is somewhat mixed. China's

remarkable growth over the last quarter of a century is, no doubt, partially due to liberalizing its markets and shedding a very sclerotic economic structure. At the same time, the Chinese state has been far too involved in production, regulation, and planning to discount state developmentalist approaches (Onis and Senses 2005; Lin 2012, 2013). Similarly, Russian growth has occurred during periods of reversal of liberalization and the reclaiming of planning on the part of the state (Ferdinand 2007). Of course, most of this has consisted of a recovery of income to pre-collapse times and has occurred during a phenomenal boom in petroleum and natural gas prices which makes it more difficult to assess the role of the state in generating growth. Similarly, although Indian growth was weak in per capita terms for most of the pre-reform years and has been robust since "there is no statistically valid break in the series in 1991, implying that, so far, on a trend basis, GDP has continued to grow since 1991–1992 at the same rate as it did during the previous decade at 5.7% per year" (Nagaraj quoted in Adams 2002). In the case of Brazil, reforms appeared piecemeal during the late 1980s and early 1990s. It was not until the presidency of Fernando Henrique Cardoso (FHC) (1994–2002) that a comprehensive reform agenda was proposed and largely implemented (Spanakos 2004). Hyperinflation was eliminated and inflation was brought under control, though the country remained susceptible to external shocks. While this constituted a clear and palpable improvement, post-stabilization growth has been weak.

To sum up, the divergence of growth outcomes is not surprising given that academic literature has not found a significant improvement of total liberal packages on economic growth and has found some individual reforms to be negative.

8.4 Macroeconomic Policies and Economic Performance: The Experience of Brazil and China

Given the above discussion, it is suggested that the menu of liberalization did not produce the growth that was expected while less liberalized systems grew more robustly. The argument is a bit more precise than this as

liberalization is not bad per se but reforms in certain areas do introduce aspects which weaken growth sustainability. This section will argue that selective macroeconomic policies explain the difference in growth performance between the Brazilian and Chinese economies. This revives the debate over exchange rate regimes (floating *vis-à-vis* managed) and capital controls in emerging markets, a debate which intensified given exchange rate and financial crises in Mexico (1994–1995), East Asia (1997), Russia (1998), Brazil (1998–1999), and Argentina (2001–2002).[7]

The main outcome of this debate is that, according to the conventional view, implementing a free-floating exchange rate regime and ample capital mobility, even when backed by responsible or credible economic policy—in line with WC prescriptions[8]—leaves emerging countries prone to the humors and short-term logic of capital accumulation. The conventional argument on the difficulties facing such countries is to attribute the volatility of foreign financing to the irresponsible economic policies they adopt (Caramazza and Aziz 1998).[9] Thus, economists from this liberal position argue that a flexible exchange rate regime with capital account convertibility is fundamental for emerging countries to absorb the capital inflow and respond to the changing productive capacities in these economies (Edwards and Savastano 2000; Edison et al. 2002; Fischer 1998; Obstfeld and Rogoff 1995). Accordingly, the benefits of a flexible exchange rate and unregulated capital flows for an emerging market is that these policies (1) reduce the sources of external vulnerability and (2) increase the autonomy of monetary policy. Similarly, financial liberalization (1) allocates efficiently savings (domestic and foreign), (2) disciplines macroeconomic policies, and (3) improves the economic growth performance. An additional argument is that a floating exchange rate regime, in a context of capital mobility, could increase the autonomy of monetary policy, overcoming the 'impossible trinity' that says that a country cannot have at the same time capital account convertibility, a fixed exchange rate regime, and monetary policy autonomy in order to achieve domestic objectives.

Eichengreen and Leblang (2002) and Rodrik (1998) show that it is difficult to establish a robust relationship between financial liberalization and economic growth performance for developed and, especially, emerging countries.[10] Interestingly, Eichengreen and Leblang (2002, p. 2) suggest

that developed countries first developed their domestic financial market, followed by restricted capital account on vertibility, and then they liberalized their capital account: "the impact of capital account liberalization is more likely to be positive when the domestic financial system is smooth and stable. It is more likely to be negative when domestic and international financial markets are subject to crises". So, it is likely that the causality between financial liberalization and economic growth is reverse: countries that have a robust economic growth can choose to take part in the financial integration, even if it does not contribute directly for a greater economic growth.

Moreover, a floating exchange rate regime frequently works in the real world differently from what is supposed in the text books. According to Grenville (2000), fundamentals cannot explain the behavior of exchange rates over a short-medium-term horizon—that is, exchange rates have at times exhibited long-lived swings with no apparent changes in fundamentals significant enough to justify them. The problems related to the exchange rate volatility are greater for emerging countries, as they have (1) no long historical experience of a market-determined exchange rate; (2) few speculators acting in the exchange rate market—that is, there has been a lack of players willing to take a contrarian foreign exchange position in emerging countries; and (3) much larger and volatile capital flows, in relation to the size of their capital markets and economies more generally. According to Ho and McCauley's data (2003), despite rapid growth in activity during the 1990s, foreign exchange markets in most emerging countries continue to be relatively small and less liquid than their counterparts in the industrialized world. This suggests that emerging foreign exchange markets are more prone to one-sided bets and instability because they are thin and subject to a high degree of uncertainty and information asymmetries (Moreno 2005, p. 10).

Thus, the heterodox view, meanwhile, regards floating exchange rate and high capital mobility as a destabilizing combination of factors that intensify exchange rate crises in emerging countries. This has reinforced the opinion of heterodox economists and some policymakers of the necessity of introducing capital controls and an exchange rate regime that prevents excessive exchange rate fluctuations. They argue that such policy autonomy is fundamental to assuring sustainable economic growth and harmonious social development.

8.4.1 Brazil: Macroeconomic Instability and Economic Growth à la Stop-and-Go

In 1994, Brazil implemented the *Real* Plan (RP), an exchange rate based stabilization plan designed to reduce inflation without producing a negative shock to growth. The RP differed from Argentina's Convertibility Plan, in that it adopted a more flexible exchange rate anchor. At the launch of the Brazilian program in July of 1994, the government's commitment was to maintain an exchange rate ceiling of one-to-one parity with the dollar. Moreover, the relationship between changes in the monetary base and foreign reserve movements was not explicitly stated, allowing some discretionary leeway. After the Mexican crisis in early 1995, the exchange rate policy was reviewed and, in the context of a crawling exchange rate range, the nominal rate began to undergo gradual devaluation.

The RP was successful in reducing inflation from quadruple to single digits, due to the combination of exchange rate appreciation, high interest rates, and a huge reduction in import taxes.[11] However, the expansion of demand, which had emerged from the fiscal side, and the overvalued exchange rate created immediate difficulties for Brazil's external sector which a saw a USD 10.4 billion surplus in 1994 become an accumulated trade deficit of USD 22.3 billion between 1995 and 1998 and a current account registered an accumulated deficit of around USD 105.0 billion. This external imbalance rendered the Brazilian economy particularly vulnerable to speculative attacks on the *real* and Brazil experienced a "mix of a 'contagious crisis' arising out of the effects on Brazil of the [Mexican crisis], East Asian and Russian crises and an outbreak of speculative activity triggered by market operators who perceived evident macroeconomic imbalances in Brazil" (Ferrari Filho and Paula 2003, p. 77).

The macroeconomic position of the government was further aggravated during the 1998 presidential electoral campaign. Given the political constraints of being a candidate for reelection, FHC—the architect of the RP—was loathe to weaken the currency regime and was forced to defend the *real*. This necessitated the Brazilian Central Bank (BCB) raising interest rates and selling dollar reserves (Spanakos and Rennó 2006). Despite offers of support and efforts to lend credibility to Brazilian policymakers from the IMF, capital continued to flow out of the country and

foreign reserves fell rapidly during the course of the campaign and even after the reelection of president FHC. Finally, in January 1999, given the macroeconomic imbalances and uncertainties about the RP's future, the FHC government changed the exchange rate and allowed the *real* to float. The government had battled to protect the exchange regime at considerable cost in terms of reserves and growth, but now believed that by floating the currency, it would be less vulnerable to future speculative attacks.[12]

But, given the history of inflation and the low appetite for risk among investors, the new floating regime was tested to see where the new range of the *real* would be. This pressure on the exchange rate let to the adoption of a set of economic policies based on an ITR and primary fiscal surplus. Since 1999, these three principles have been considered fundamental to Brazilian macroeconomic policy (Montero 2014).

Growth during the 1980s and 1990s had been low and volatile, but the expectation was that once inflation had been eliminated, Brazil could resume the high levels of growth it experienced from the post-War period until the Debt Crisis. Yet, since the beginning of the twenty-first century, the Brazilian economy continues to display patterns of low and volatile growth. Moreover, since the RP, the GDP growth rate has been low and has had a 'stop-and-go' pattern: between 1995 and 2016, the annual average GDP growth was 2.0%. This low economic growth can be explained by (1) the external vulnerability (particularly from 1995 to 2002 and 2008 to 2016) due to the process of financial liberalization,[13] (2) the high real interest rates, (3) a recessive fiscal policy (maintenance of primary surpluses to reduce debt, especially since 1999), and (4) nominal exchange rate appreciation (from 1995 to 1998 and from 2004 to 2011).

As we know, under the ITR, monetary policy is taken as the main instrument of macroeconomic policy. That is, the focus of monetary policy is on price stability, along with three objectives: credibility (the framework should command trust), flexibility (the framework should allow monetary policy to react optimally to unanticipated shocks), and legitimacy (the framework should attract public and parliamentary support). Credibility is recognized as paramount in the conduct of monetary policy to avoid problems associated with time-inconsistency. Moreover, monetary policy is viewed as the most direct determinant of inflation, so much

so that in the long run, the inflation rate is the only macroeconomic variable that monetary policy can affect. Finally, it is argued that monetary policy cannot affect economic activity, for example, output or employment, in the long run. The results, however, suggest otherwise. Table 8.2 (annex) shows a consistently high interest rate and a sharp instability of the nominal exchange rate. For example, from 2000 to 2016, the average nominal basic interest rate was 13.8% per year, and the exchange rate movement was quite unstable and volatile—from 2000 to 2003, it was devaluated; from 2004 to 2012, it was appreciated; and from 2013 to 2016, it was again devaluated. As a result of these high interest rates and unstable and volatile exchange rate, the average economic growth in this period was very low: 2.0% per year.

Monetary authorities have operated with a clear and heavy preference for maintaining low inflation. Given this priority, the BCB has maintained high interest rates which discourage monetary expansion and are recessionary in nature. Rising interest rate punishes firms, by reducing their access to credit, and workers, who lose their jobs when firms face difficulties, but rewards *rentiers* and speculators, who hold public securities. Ironically, the expansion of Brazilian debt markets signaled in the Goldman and Sachs reports cited above has been consistent with a decline in output and employment, and, at the same time, increased the volume of public debt.

In terms of fiscal policy, ITR does not view fiscal policy as a powerful macroeconomic instrument (in any case, it is hostage to the slow and uncertain legislative process), believing instead that monetary policy dominates and forces fiscal policy to be neutral (Mishkin 2000). Since implementing the ITR, the Brazilian government has maintained high target goals for primary surplus (between 3.75% and 4.25% of GDP from 2000 to 2008 and between 2.0% and 3.0% of GDP from 2009 to 2016[14]), in order to guarantee the service of outstanding public debt. As a result of the strict fiscal constraints during this period, net public debt as a percentage of GDP dropped from 44.5% in 2000 to 36.0% in 2015[15] (Table 8.2, annex). Primary fiscal surplus has contributed to lowering debt, but the external vulnerability which was exposed in 2002–2003 led to an explosion of debt. Therefore, while fiscal surplus may be a medicine with long-term value, it may have contributed to the conditions which

increased short- and medium-term debt stock, which further emphasizes the point about volatility of growth associated with the Brazilian government's adoption of the ITR.

It is important to mention that from 2003 to 2007 net exports were the main source of growth for the Brazilian economy and enabled the BCB to increase foreign reserves from USD 49.3 billion to USD 180.3 billion (Table 8.2, annex). Moreover, during all periods the current account accumulated surplus and, as a result, the main indicator of external vulnerability improved notably.

In 2007, at the start of Lula da Silva's second term, fiscal policy shifted course slightly in order to extend social protection and income transfer programs, increase the minimum wage, and expand public investment, especially investment under the Growth Acceleration Program (*Programa de Aceleração do Crescimento*, PAC).[16] The BCB, however, continued to operate monetary policy in such a way as to meet inflation targets. Also, once again, Brazil and most other emerging countries benefited from higher commodity prices, which contributed both to their achieving significant current account surpluses and accumulating international reserves.[17]

Lula da Silva's response to the international crisis, although late, represented an important shift from previous crisis episodes (for instance, the Brazilian exchange rate crisis in 1998–1999), where the central government had pursued pro-cyclical policies, usually within the framework of the IMF stabilization programs, hoping to steady the humors of financial investors, and responded to the contagion effect of the systemic crisis with a broad variety of countercyclical economic measures, such as: (1) the tax on financial operations was cut from 3.0% to 1.5% for direct consumer credit operations and overdraft credit; (2) income tax brackets for physical persons were revised, favoring middle-class families, that is, those families earning up to USD 875 per month; and (3) the tax on manufactured products was temporarily cut; and (4) the Tax on Industrial Products (IPI) was cut for motorcycles, trucks, and automobiles.

In addition, the BCB eased monetary policy by lowering the basic interest rate (Special System for Settlement and Custody, Selic) from 13.75% in January 2009 to 8.75% in September 2009 and by increasing liquidity in the interbank market, as well as state-owned banks—*Banco*

Nacional de Desenvolvimento Econômico e Social (BNDES), *Banco do Brasil* (BB) and *Caixa Econômica Federal* (CEF)—were instructed to irrigate the economy, in a context where private banks (national and foreign) decided to not expand credit facilities to consumers and corporations. Indeed, "[m]ore than 83 percent of the growth available credit to the private sector in Brazil in 2008 and 2009 came from the public banks, with BNDES accounting for a third of that amount" (Montero 2014, p. 127). As a result of the Brazilian 'quantitative easing', the credit/GDP increased from 35%, in the beginning of the last quarter of 2008, to 50% at the end of 2012 (BCB 2018).

At the same time, on the one hand, BCB implemented macro-prudential measures to mitigate financial risks, and, on the other hand, in terms of exchange rate, it adopted specific measures to (1) smooth exchange rate volatility and alleviate short-term foreign exchange pressure, (2) provide forward dollar liquidity to alleviate pressure on corporations deterring them from unwinding hedging positions, (3) increase the availability and reduce the cost of foreign exchange for Brazilian corporations and banks over the terms of swap, and (4) provide dollar financing for exporters.

As a result of these countercyclical economic policies, after experiencing a recession in 2009, the Brazilian economy grew by 7.5% in 2010. Brazil's economic recovery brought with it restored flows of international capital and, as a consequence, problems associated with periods of prosperity, including the tendency for the real to appreciate. But, in late 2010 and 2011, the BCB decided to increase the interest rate to avoid inflationary pressures caused by robust economic growth, mainly in 2010 when GDP grew 7.6%. The economic authorities, at that time, argued that low capacity utilization in the industrial sector in 2009 and low rates of new investment in 2010 contributed to an inflationary process. Thus, in a context of expanding consumption and low rate of new investments, there was a demand-pull inflation process.[18] At the same time, financial market volatility due to the Euro crisis, competitive pressures from Chinese manufactured products in the domestic market and third party markets, a lack of strength in the manufacturing sector, appreciation of the *real*, major deficiencies in infrastructure, and other problems raised doubts about the outlook for the Brazilian economy. Accordingly, monetary and fiscal policies reverted to previous conventional approaches

and, in 2011 and 2012, the Brazilian economy grew by only 2.7% and 1.0%, respectively, which were modest rates and below the regional average (IMF 2018).

Table 8.2 (annex) shows that the nominal exchange rate appreciated from 2004 to 2012 basically due to both increase of the trade surplus (mainly during 2003–2007 period) and capital flows. The growth of trade surplus is a result of an increase in world demand for Brazilian products and an increase in commodity prices (mineral and agricultural) while capital flows have been attracted by high yield differentials between domestic and foreign bonds. Under these conditions, there has been a reduction of external indebtedness, an improvement of the indicators of external vulnerability and foreign reserves have increased from USD 33.0 billion in 2000 to almost USD 372.2 billion in 2016. However, from 2013 to 2015, trade balance and current account accumulated a huge deficit, respectively, USD 26.1 billion and USD 231.2 billion (Table 8.2, in annex) due essentially to the reduction in the volume of the international trade, mainly commodities, as a result of the decline in the economic growth of China.[19]

Due to the gradual worsening in the international scenario (Euro crisis and the decline in growth in emerging economies, including China), Dilma Rousseff's government implemented some important changes in the 'modus operandi' of economic policy. Those changes included the adoption of a more gradualist strategy of the BCB to deal with inflation,[20] and the introduction of a countercyclical fiscal policy. Thus, from 2011 to 2014, the primary fiscal result dropped from 3.1% of GDP to 0.6% of GDP and the inflation rate increased to the upper range limit of the ITR. But, at that time, public expenditures and tax reduction were not enough to compensate for the overall reduction in the aggregate demand. In this period, the annual average economic growth of Brazil was only 1.7% (Table 8.2, in annex).

Thus, Dilma Rousseff's first term (2011–2014) was an attempt to replace the macroeconomic policy tripod (ITR, primary surplus target, and flexible exchange rate regime) that was implemented in FHC's second term and was adopted during the first and second terms of Lula da Silva.

In the beginning of Dilma Rousseff's second term, the interest rate increased[21] and fiscal austerity was adopted. Given that, and in a context of slowdown of the world economy and decline of the commodity prices,

the Brazilian economy entered a deep recession: in 2015 and 2016, the GDP accumulated a drop of 7.5%. Moreover, in 2015, the inflation rate increased to 10.7%, mainly due to a huge devaluation (almost 50.0%) of the exchange rate and the readjustment of public and administered prices (basically, energy and gasoline).

To sum up, the Brazilian economic performance, from 1995 to 2016, shows the following characteristics: (1) despite the fact that inflation rate was kept under control, its average rate was relatively high at 7.3% per year—even considering the ITR period, it is very high: the average inflation rate from 1999 to 2016 was 6.8% per year; (2) the annual nominal and real interest rates were very high; (3) the nominal and real exchange were volatile and in much of the period, due to the exchange rate appreciation trend, there were a situation of the balance of payments disequilibrium and deindustrialization (Bresser-Pereia 2010); and (4) the average annual growth rate of GDP was only 2.0%.

Finally, it is important to mention two aspects of the outcome of the macroeconomic strategies of the EA in the last two decades. First, the 'institutional' changes that accompanied the RP were not actually embedded by economic agents, thus preventing the creation of an institutional environment favorable to investment. Secondly, the macroeconomic policy after 1999, which was based on the New Macroeconomic Consensus (NCM)—comprising an ITR and fiscal surplus targets, together with a flexible exchange rate—limited the autonomy of monetary and fiscal policies and, consequently, their impact on GDP. In summary, from 1995 to 2016, the institutional and macroeconomic conditions did not arouse the entrepreneurs' animal spirits, and for this reason, the relationship between investment and GDP was so low (Table 8.2, annex).

8.4.2 China: Economic Growth with Managed Exchange Rate and Restricted Capital Inflows

Annual average rate of GDP for China between 1995 and 2016 was a blistering 9.0%. This high growth rate is largely due to the growth of the export sector[22] and is fueled by investment. Expansion of investment in China is very obviously a result of the (1) open-door policy initiated in the 1980s and (2) of state participation in bank credit and low interest rates.[23]

Economic openness in Chinese economy was gradual and there were three phases in attracting capital flows (Shengman 1999). From 1980 to 1986 was a period of 'mutual learning' where Chinese authorities and population and foreign investors learned from each other. Foreign direct investment (FDI) ventures in China started in the 1980s when the special economic zones were created and, at the same time, economic policies were implemented.[24] The second phase (1987–1991) was one of 'getting ready', during which laws and regulations were created and measures were adopted to attract foreign investment to different economic sectors and geographic locations. Finally, since 1992, there has been the 'rapid-increase' phase, characterized by the rapid transformation in Chinese economy (from a planned economy to a market economy). During this period, China benefited from a shift in global allocation of private investment toward emerging markets. According to Paula (2007, p. 27), "[m]ajor changes in the functioning of the economy were introduced in the 1990s, such as encouragement of foreign investment, reduction of effective tariffs on imported inputs, the modernization of public corporations, the abolition of multiple exchange rates, and the introduction of convertibility for current account transactions".

China has been the principal recipient of foreign capital flows in recent years among emerging markets. Such capital inflows can cause several macroeconomic effects, such as, expanding the domestic money supply and putting pressure on the domestic prices and the exchange rate. However, this has not happened for the period under study here. From 1995 to 2016, the average inflation rate was 2.3% per year. China did suffer from a short period of high inflation in the mid-1990s (more specifically in 1995 and 1996, when the average inflation rate was 8.5% per year), but since 1997, China has experienced periods of deflation (1998, 1999, 2001, 2002, and 2009) and low inflation rates, excepting in 2008 and 2009. In other words, inflation rates have been under control and moderate despite the tremendous capital inflows that the Chinese economy has had to accommodate over the past decade and a half. This has been possible because of the flexible monetary policy and fiscal austerity enjoyed by the Chinese monetary authorities, particularly the People's Bank of China (PBC), the Chinese central bank.

The PBC has managed the domestic money supply in order to absorb the capital inflows and soften their effect on macroeconomic indicators. In the 1990s, it applied credit restrictions to financial institutions, while in the 2000s, monetary policy was more flexible. This means that the average nominal interest rate was very low: 4.5% per year. Moreover, China has shielded the domestic financial system from these capital inflows because there are (1) limitations on the entry of foreign banks in the financial market and (2) convertibility restrictions on the foreign currency transactions of domestic financial institutions.

During the Chinese transition from a closed to an open economy, the exchange rate regime has changed several times and has been the main instrument of economic policy. After a long period of centralized and fixed exchange rate regimes, in the 1990s, the exchange rate was devalued and a managed floating exchange rate regime was adopted. The *yuan* has been de facto 'fixed' to the US dollar since the end of the 1990s (Table 8.3, in annex, shows the relative stability of the exchange rate from 1995 to 2006; after a valuation of *yuan* in 2007 the exchange rate became relatively stable until 2016). Since then, PBC's intervention to maintain a stable exchange rate has been significant, largely due to capital control mechanisms on both inflows and outflows.[25] Moreover, they introduced a system in which the exchange rate would be determined by a basket of currencies. In other words, the PBC has acted as a *market maker* in the foreign exchange market.

As mentioned above, the management of the exchange rate has been possible due to the existence of capital controls on both inflows and outflows. According to Zhao (2006), capital controls in China have the following objectives: (1) help direct external savings to desired uses; (2) keep monetary policy independent of the influence of international developments, under a context of a managed exchange rate regime; (3) prevent firms and financial institutions from taking excessive external risks; (4) maintain balance of payments equilibrium and keeps exchange rate stability; and (5) insulate the economy from foreign financial crises.

With a stable exchange rate, increasing trade surplus, and inflows of FDI,[26] China has accumulated an impressive amount of international reserves (from USD 186.3 billion in 2000 to USD 3.0 trillion in 2016).[27] As a consequence of the continuous trade surplus, the expressive accumulation

of international reserves, the capital controls' mechanisms, and a low level of external debt, external vulnerability is low. This was evident from the insulation of the Chinese economy during the numerous emerging market crises since 1995, but especially during the Asian Crisis.

Chinese fiscal policy has complemented monetary policy with a careful eye to maintain policymaking autonomy and limit external vulnerabilities. As public companies shifted toward mixed and private concerns, the government acquired considerable state and quasi-state debt. It did this by increasingly shaving the government deficit with a tendency toward balance. As a result of conservative fiscal policy and growing state revenues, fiscal deficit has been relatively stable[28] and the domestic debt has been under control. All of this helps to explain the limited vulnerability of the Chinese economy to the fits and starts more typical among emerging markets, particularly Brazil. They also have contributed to an environment in which robust sustainable growth was possible.

Since the international crisis was begun in developed countries and many emerging countries were relatively sheltered, a number of analysts and policymakers gave credence to the hypothesis of a 'decoupling' of emerging countries; that is, the notion that these economies would be able to sustain their dynamic performance and prove immune to contagion from the crisis. In 2008, moreover, the main concern among central banks, market analysts, and multilateral organizations was with the inflationary pressures that emerging countries might suffer as a result of strongly rising food and oil prices.

However, particularly after Lehman Brothers failed in September 2008, economic agents' expectations as to the magnitude of, and developments from, the international financial crisis changed radically. The crisis spread to the whole world economy by a contagion effect, affecting the credit and capital markets, as well as international trade, especially by countries dependent on commodity exports, whose prices fell abruptly. In that context, some emerging countries experienced not just macroeconomic instabilities (in terms of economic activity or price volatility) but also situations of fiscal and external fragility, regardless of whether or not—prior to the crisis—they had displayed what were regarded as sound macroeconomic fundamentals

The outcome was no different in China: the GDP growth rate dropped from 11.7%, in 2007, to 9.6% in 2008 and 9.2% in 2009. However, Chinese EA's response to the international financial crisis was fast in terms of monetary policy (the basic interest rate was reduced and there was credit expansion) and fiscal stimulus (an aggressive plan was implemented, which amounted, for public spending and investment, equivalent to some 12.5% of the GDP in 2008 and 2009). Thus, GDP growth in 2010 increased by 10.4%. These actions contributed to an unanticipated situation in which despite the recession in the US, the primary trading partner of China, the relationship between investment and GDP increased from 44.0%, in 2008 to 49.0% in 2012. However, due to the slowdown of China (as well as an effort to channel more money toward domestic consumption) from 2013 to 2016, the relationship between investment and GDP dropped to 42.9% in 2016.

In 2011, China launched its 12th five-year plan for 2011–2015 based on the following measures to improve the industrial sector: energy and environmental protection, biotechnology, high-tech manufacturing, and information technology.

Moreover, due to the 'bad' performance in terms of GDP and concern about shadow banking in recent years, the 18th Central Committee of the Communist Party of China (CPC) decided to approve, in 2012, deep reforms in the Chinese economy aimed at improving the modernization of the country to enlarge the relationship between the government and the market (Jinping 2013).

According to the main resolutions of this meeting, the idea is that the Chinese public sector will continue to be dominant, playing the leading role of the state-owned economy, while the private sector will be encouraged and supported. The reform proposals include the following: (1) to build a modern fiscal system that supports the initiative of both central and local governments; (2) to improve a new type of relation between industry and agriculture and between urban and rural areas; (3) to expand investments in the social sector including education, employment, income distribution, social security and public health; (4) to step up the development of free trade zones and increase opening up of inland, coastal, and border areas; and (5) to build a comprehensive system for ecological progress that protects the environment.

To sum up, in the last decades, China built a consistent global strategy based on a state-led growth model able to, on the one hand, create endogenous institutional mechanisms, such as the existence of a state organization, to mitigate the uncertainty of economic agents' decisions, and, on the other hand, stimulate effective demand by state intervention, mainly through China's Development Bank. This is, in our opinion, the Idea of the Keynes' (2007, p. 378) "socialization of investment".

Given that, in 2016, the Chinese GDP became the second largest in the world, China was the largest exporter and, as a result, had the largest current account surplus and has the biggest amount of foreign reserves.

8.5 Conclusion

This comparative study of Brazilian and Chinese macroeconomic policies and outcomes aims to address the puzzle of why the Brazilian economy, despite considerable liberal reforms, has not produced stable and robust growth. It has done this by comparing Brazil to peers in the BRICS group, gleaning information from recent research on the relationship between reforms and growth, and by a focused comparative case study with China. The chapter agrees with the finding in the literature that broad liberal reform agenda did not necessarily produce stable and robust economic growth. On the contrary, policies that allow governments to maintain autonomy of macroeconomic policies seem to have more of an effect in limiting external vulnerability and in producing growth, particularly. This confirms Ferrari Filho and Paula (2006) who find that the economic performance of BRICS countries is the result of the exchange rate regime, capital account convertibility, and fiscal and monetary regimes adopted in each country.

This suggests the necessity of (1) ensuring that monetary policy has a significant positive impact on the level of economic activity, (2) directing financial markets toward financing development rather than *rentier*-like behavior, and (3) creating efficient anti-speculation mechanisms to control (or regulate) movements of capital in order to prevent monetary and exchange rate crises and augment the autonomy of domestic decision-makers. Exploring the last issue, the main difference between

Brazil and China is that, paraphrasing and adapting Stiglitz (2002), financial liberalization and capital mobility in the Brazilian economy in the 1990s were at the center of its currency crisis, while China, due to its measures of capital controls, could manage monetary and fiscal policies pro-economic growth. Interestingly enough, in a panel survey of 49 developing countries between 1970 and 1995, Gastanaga et al. (1998) find that most policy reforms did not have much of an effect on attracting FDI, though capital controls were associated with an increase in FDI and the most important factor was economic growth.

Uninterrupted and robust economic growth is the goal of all policymakers, especially in the developing world. Although academic literature has yet to produce clear causal relationships which explain the necessary components for such growth and how to bolster these components, empirical analysis of peer country performance gives valuable signals to policymakers. It may be difficult to say exactly with certainty why China has grown so robustly and consistently but when Brazil is compared against China, a strong case may be made for why growth may be weak and interrupted.

Finally, two additional comments: first, the case of China shows how gradual and careful management of capital account and countercyclical economic policies can reduce external vulnerability and assure sustainable economic growth, while the Brazilian case shows how the adoption of more liberal policies without reversing the condition of external vulnerability has resulted in higher exchange rate volatility, higher interest rates, and a poor economic growth. In other words, unlike Brazil, China has created institutional and macroeconomic conditions to limit the market's 'animal spirits'. Table 8.1, adapted from Paula (2007), shows a comparative synthesis of the analysis of the macroeconomic policy of Brazil and China. Second, unlike in China, where the government has long-employed countercyclical economic policies, the application of such policies in Brazil were pragmatic responses to the Great Recession and do not necessarily represent a shift in orientation of macroeconomic policies. To fail to make such a shift is to ignore the lesson China offers Brazil and other emerging economies.

To conclude, it is important to mention that the main differences between the two countries are not only the macroeconomic policies, as was shown in this chapter. Both countries have, also, (1) different development

Table 8.1 Exchange rate regime and capital account convertibility of Brazil and China

Country	Exchange rate regime	Monetary regime	Capital account convertibility	Exchange rate volatility
Brazil	1995–1998: "Fixed" exchange rate Since 1999: Dirty floating regime	1995–1998: Tight monetary policy Since 1999: Inflation targeting regime	High	High
China	Pegged exchange rate	Countercyclical	Partial, with many restrictions	Very low

Source: Author's elaboration based on Paula (2007)

strategies, China has a state-led growth strategy while Brazil has a liberal economic model strategy; (2) in China, the financial system is structured and regulated by the PBC while in Brazil the BCB is informally independent; and (3) China has implemented structural reforms to attract FDI and promote public-private partnerships while Brazilian governments are not able to implement them and, as a result, improve the relationship between investment and GDP.

Annex

Table 8.2 Selected macroeconomic indicators of Brazilian economy

Indicadors/Year	1995	1996	1997	1998	1999	2000	2001	2002	2003
Inflation (IPCA) (%)	22.41	9.56	5.22	1.66	8.94	5.97	7.67	12.53	9.3
Growth Rate (GDP) (%)	4.2	2.1	3.4	0.0	0.2	4.3	1.3	2.7	1.2
Average Nominal Interest Rate (Selic) (%)	54.5	27.5	25.0	29.4	26.1	17.6	17.5	19.1	23.3
Average Nominal Exchange Rate (R$/USD)	0.92	1.0	1.08	1.16	1.81	1.83	2.35	2.93	3.08
Net Trade Balance (USD Billion)	−3.5	−5.6	−6.8	−6.6	−1.2	−0.7	2.6	13.1	24.8
Current Account (USD Billion)	−18.4	−23.5	−30.5	−33.4	−25.3	−24.2	−23.2	−7.6	4.2
Foreign Reserves (USD Billion)	51.8	60.1	52.2	44.6	36.3	33.0	35.9	37.8	49.3
Fiscal Surplus/GDP (%)	0.2	−0.1	−0.9	0.0	3.2	3.5	3.6	3.9	4.3
Net Public Debt/GDP (%)	29.1	29.6	30.4	35.4	44.5	45.5	48.4	50.5	52.4
Investment/GDP (%)	18.3	16.9	17.4	17.0	15.7	16.8	17.0	16.4	15.3

Indicadors/Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Inflation Rate (IPCA) (%)	7.6	5.69	3.14	4.46	5.9	4.31	5.91	6.5	5.84	5.91	6.41	10.7	6.29
Growth Rate (GDP) (%)	5.7	3.2	3.7	5.4	5.2	−0.3	7.6	2.7	1.0	3.0	0.1	−3.8	−3.6
Average Nominal Interest Rate (Selic) (%)	16.2	19.1	15.3	12.0	12.7	10.1	9.9	11.75	8.63	8.29	10.96	13.37	9.75
Average Nominal Exchange Rate (R$/USD)	2.92	2.43	2.17	1.92	1.83	2.0	1.76	1.67	1.95	2.16	2.36	3.33	3.49
Net Trade Balance (USD Billion)	33.6	44.7	46.5	40.0	24.7	24.6	20.3	29.8	19.4	2.6	−3.9	19.6	47.7

(*continued*)

Table 8.2 (continued)

Indicadors/Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Current Account (USD Billion)	11.7	14.0	13.6	1.5	−28.3	−24.3	−47.5	−52.6	−54.2	−81.4	−90.9	−58.9	−23.5
Foreign Reserves (USD Billion)	52.9	53.8	85.8	180.3	193.8	238.5	288.6	352.0	373.1	358.8	363.6	368.7	372.2
Fiscal Surplus/GDP (%)	4.8	4.3	4.0	3.91	4.1	2.1	2.8	3.1	2.4	1.9	−0.6	−1.9	−2.5
Net Public Debt/GDP (%)	47.0	46.5	44.7	43.0	36.0	43.0	39.1	36.5	35.1	33.8	36.7	36.0	45.9
Investment/GDP (%)	16.1	16.0	16.5	17.5	19.1	18.1	19.4	18.5	18.1	18.5	17.4	18.2	16.4

Source: BCB (2018), IBGE (2018) and IPEA DATA (2018)

Table 8.3 Selected macroeconomic indicators of Chinese economy

Indicadors/Year	1995	1996	1997	1998	1999	2000	2001	2002	2003
Inflation (CPI) (%)	10.1	7.0	0.4	−1.0	−0.9	0.9	−0.1	−0.6	2.7
Growth Rate (GDP) (%)	10.9	10.0	9.3	7.8	7.6	8.4	8.3	9.1	10.0
Average Nominal Interest Rate (%)	n.a.	n.a.	n.a.	6.85	3.66	2.6	2.5	2.1	2.6
Average Nominal Exchange Rate (Yuan/USD)	8.35	8.31	8.29	8.28	8.28	8.28	8.28	8.28	8.28
Net Trade Balance (USD Billion)	18.0	19.5	46.2	16.6	36.0	34.5	34.0	44.1	44.6
Current Account (USD Billion)	1.6	7.2	37.0	31.5	21.1	20.5	17.4	35.4	45.9
Foreign Reserves (USD Trillion)	0.07	0.11	0.14	0.15	0.16	0.17	0.22	0.29	0.41
Fiscal Surplus/GDP (%)	−1.4	−1.2	−1.1	−1.5	−2.2	−2.5	−2.3	−2.6	−2.2
Net Public Debt/GDP (%)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	17.7	18.9	19.2
Investment/GDP (%)	33.0	32.4	31.8	33.0	36.3	34.1	34.4	36.3	39.4

Indicadors/Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Inflation (CPI) (%)	3.2	1.4	2.0	2.1	5.9	−0.7	3.3	5.4	2.6	2.6	2.0	1.4	2.0
Growth Rate (GDP) (%)	10.1	10.4	10.7	11.7	9.6	9.2	10.4	9.3	7.9	7.8	7.2	6.9	6.7
Average Nominal Interest Rate (%)	2.8	1.8	2.5	2.8	6.3	5.3	5.64	6.3	6.2	6.0	6.0	5.0	4.35
Average Nominal Exchange Rate (Yuan/USD)	8.28	8.19	7.96	7.76	6.95	6.83	6.77	6.46	6.31	6.11	6.13	6.49	6.34
Net Trade Balance (USD Billion)	51.2	124.6	208.9	308.0	348.8	220.1	223.0	181.9	231.8	235.4	221.3	357.8	249.9

(*continued*)

Table 8.3 (continued)

Indicadors/Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Current Account (USD Billion)	68.7	160.8	164.2	156.0	420.6	243.2	237.8	136.1	193.1	148.2	236.0	304.2	196.4
Foreign Reserves (USD Trillion)	0.61	0.82	1.1	1.5	1.9	2.4	2.9	3.2	3.3	3.9	3.9	3.4	3.1
Fiscal Surplus/GDP (%)	−1.3	−1.9	−1.7	−2.6	−2.8	−2.8	−2.5	−1.3	−1.5	−2.1	−2.1	−2.3	−3.8
Net Public Debt/GDP (%)	18.5	17.9	17.3	18.1	19.6	17.0	17.7	33.5	28.7	22.4	24.0	43.9	44.3
Investment/GDP (%)	40.7	42.1	41.6	44.7	44.0	48.0	48.0	48.1	49.0	49.0	48.0	44.7	42.9

Source: ADB (2018), IMF (2018) and OECD (2018)
Note: n.a. means not available

Notes

1. GDP growth rates calculated by the authors based on the figures of International Monetary Fund (IMF) (2018).
2. This chapter excludes South Africa from consideration because South Africa was not part of the BRICS concept for most of the time period under investigation.
3. It is important to mention that this chapter aims to explain the difference in economic growth performance in Brazil and China by analyzing and comparing *only* the macroeconomic policy that has been implemented in the Brazilian and Chinese economies since the 1990s. It does not mean, however, that some economic reforms, such as, tax reform, labor reform, and social security reform, and labor costs and productivity are not relevant to explain the growth rates in Brazil and China.
4. For a compelling comparison of planning in the USSR and China, see Hui (2005).
5. Ferrari Filho and Paula (2006) show the remarkable difference in economic growth performance of the more liberal and holistic reformers (Brazil and Russia under Yeltsin) and the more heterodox reformers (China, India, and Russia under Putin). Even if the Russian case is not considered due to its heavy dependence on petroleum and natural gas prices, the contrast between Brazil and India and China is stark.
6. This does not mean that countries indeed followed all ten. In fact, most countries emphasized only a few policies though there were less dedicated efforts to complete the list.
7. These exchange rates and financial crises yielded a consensus among academics and policymakers as to the need to restructure the international monetary system as an indispensable condition for the world economy, and particularly the emerging economies, to see a return to periods of expansion and economic prosperity. While there is a consensus that the international monetary system needs restructuring, the same cannot yet be said with regard to the mechanisms proposed to mitigate and/or put an end to instability in world exchange and financial markets. On this point, Eichengreen (1999, Chaps. 6 and 7), Eatwell and Taylor (2000), Davidson (1994, Chap. 16, and 2002, Chap. 14), and Isard (2005, Chaps. 7 and 8) offer a summary of the main options for restructuring the international monetary system.

8. The neoliberal measures advocated for emerging countries by the WC are as follows: (1) reduction or elimination of tariff barriers; (2) free capital mobility, whether for foreign investment or for convertible currency transactions; (3) fiscal discipline; (4) tax reform; (5) financial deregulation; and (6) privatizations.
9. It is important to add that the conventional theory argues that a responsible economic policy is based on the flexible exchange rate, capital mobility, and inflation targeting regime (ITR).
10. Empirical evidence of capital account liberalization upon economic performance is ambiguous, but their links with financial crises are quite evident. Economists of the IMF resume the empirical findings of the literature: "a systematic examination of the evidence suggests that is difficult to establish a robust causal relationship between the degree of financial integration and output growth performance" (Prasad et al. 2003, p. 3).
11. In August 1994, the Brazilian government reduced tariffs on imports of more than 4000 products, to a maximum of 20%.
12. In his memoires, Cardoso (2006) claims that he and his team planned to loosen the trading band if not float the *real* earlier but were prevented from doing so because of crises in Mexico (1994), Asia (1997), and the Brazilian presidential election of 1998.
13. Financial liberalization included both facilitation of outward transactions (elimination of the limits that residents can convert real in foreign currencies, with the end of the CC5 accounts) and inward transactions (fiscal incentives to foreign investors to buy domestic public securities).
14. It is important to mention that from 2009 to 2016 the targets were reduced due to the countercyclical fiscal policy to mitigate the contagious effect of the international financial crisis, 2007–2008, and the Euro crisis, 2001–2012.
15. In 2016, the relationship between net public debt and GDP increased to 45.9% due to two years of recession (2015 and 2016).
16. The Brazilian government launched the PAC in January 2007 with three main objectives: to stimulate private investment, increase government investment in infrastructure, and remove the main obstacles to economic growth (bureaucracy, inadequate norms and regulation). For details, see Brasil (2018).

17. Table 8.2 (annex) shows that foreign reserves increased from USD 85.8 billion, in 2006, to USD 193.8 billion, in 2009.
18. For additional details about the relationship between high interest rates and unstable and volatile exchange rate and economic growth, see Arestis et al. (2011), Araujo et al. (2016), and Martins et al. (2017).
19. While there is an important presence in its import contents of products that rely extensively on technology, Brazilian exports are still very much concentrated on agricultural and mineral commodities, such as soy, steel, and iron, natural resources, and technological low-intensive industrial products.
20. It is important to mention that the deceleration of the inflation, due to the reduction in the commodities' prices and in domestic demand, made possible a steady policy of reduction of the Selic.
21. It is important to mention that the high level of interest rate is the main obstacle to create a long-term financing system to stimulate private investments in the real sector, mainly in the industry.
22. In the 1980s, the China's share in the world trade was around 0.8% while in the 2000s it was almost 8.0%.
23. According to OECD (2005), the relation banking credit/GDP, under a bank-based system dominated by state-owned banks, has been almost double compared to the OECD area.
24. In the beginning, FDI was highly regulated, but in the 1990s some changes were introduced to encourage FDI. These included reduction of effective tariffs on imports, modernization of the public corporations, and changes to the exchange rate regime.
25. Capital controls in China have been used to keep monetary policy independent, to prevent firms and financial institutions from taking external risks, to maintain balance of payments equilibrium, and keep exchange rate and to avoid the economy from foreign financial and exchange rate crises.
26. It is important to add that FDI has been attracted by the long-term growth perspective of the Chinese economy.
27. The fact that China has USD 3.0 trillion in foreign reserves placed the country in a very special situation in the global financial market.
28. From 1995 to 1998, the fiscal deficit was around 1.3% of GDP; from 1999 to 2002, it increased to 2.4% of GDP; from 2003 to 2006, it dropped; and from 2007 to 2016 it ranged due to fiscal stimulus.

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9

The Economic Relationship Between Brazil and China: Recent Trends and Prospects

Santiago Bustelo and Marcos Reis

9.1 Introduction

The economic and political rise of the People's Republic of China over the past four decades has few parallels in world history. Particularly in the last ten years, from the entry of China into the WTO, the perception of the commercial importance of China for Latin America—especially in South America—became increasingly evident.

For Brazil, the importance of China as an economic partner, especially in trade and loans, significantly increased in the last decade. For instance, China represented only 2% of Brazilian exports and imports in 2000. Bilateral trade boosted from the early years of the 2000s, reaching new

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records, with average growth of 30% per year. In 2014, only 15 years after, it was already the country's main trade partner, being responsible for 18.04% of its exports and 16.3% of its imports. The current Chinese growth model has created a strong complementarity between the two economies, with Brazil providing natural resources to China and importing manufactured goods.

Furthermore, it is clear that the economic growth cycle started in Brazil from 2003 (and ended in 2013–2014) has close relations with the economic transformations that China's growth sped up. Besides, domestic policies implemented in Brazil, as the increasing of the minimum wage and domestic market, the rise in international prices of its primary export products allowed these economic policies to be implemented by the government.

It is true that while the improvement in the economic relationship brought many benefits for Brazil, it also presents some challenges for the economy, in particular for the manufacturing sector, which started to face fierce competition with Chinese products. For instance, Barbosa (2011) divides the Latin American countries into three groups according to their relationship with the Chinese economy. There is one group formed by countries that are almost exclusively commodity exporters such as Bolivia, Chile, Ecuador, and Peru. These countries benefit from a growth of the Chinese economy in the sense that it pushes the commodities' prices up. Another group is formed by countries that do not have an abundance of exportable commodities and were more likely to face intense competitive pressure from the Chinese exports, like Mexico and some Central American Countries, for example. Lastly, there is a group formed by countries that have a more complex relationship with China since they benefit from being commodity exporters but suffer from the competition on its manufacture exports. Brazil and Argentina could be considered the best examples of this group.[1]

The Chinese economy, however, is facing substantial structural changes that are likely to shift its economic partnership with Brazil and other countries. The double-digit rate of growth and crescent import of raw materials for its investment in industry, infrastructure, and housing are unlikely to be seen again in the future. The country is facing demographic pressures—a

rebalance between investment and consumption, environmental problems, and disturbances in the financial and credit sector. In that sense, now that China can be considered a middle-income country, it will need to readapt its growth and development model to keep increasing the living standards of its population. In this context, it is crucial for Brazil to be ready for the ongoing changes in the Chinese economy and explore the best scenarios for a mutually beneficial relationship between China and the country.

This article aims to contribute with some insights that can help Brazil and China in building an economic agenda to move in that direction. For that, after this brief introduction, Sect. 9.2 analyzes the evolution of trade relations between Brazil and China at the beginning of the twenty-first century while the third focus on investments and loans between the countries. Section 9.4 discusses the current structural changes that the Chinese economy is facing under its reform process. Finally, Sect. 9.5 presents the concluding remarks.

9.2 The Evolution of Trade Between Brazil and China

The decade that covers the period 2004–2014 inaugurates a time when the Sino-Brazilian relationship was reaching a new phase and bilateral exchanges in political and economic fields acquired more relevance. Bilateral trade boosted from the early years of the 2000s, reaching new records, with average growth of 30% per year, from USD 9.15 billion in 2004 to USD 77.9 billion in 2014. The stunning increase of the trade between the countries can be verified in Fig. 9.1.

The high demand for food and natural resources from China provided a surge in Brazilian exports of commodities, particularly iron ore, soybeans, meat, oil, and pulp. The good results in trade between the two countries made China the largest trading partner of Brazil from 2009 onward, surpassing the US. In this period, Brazil—as opposed to other countries in the region—accumulated a significant bilateral trade surplus with China. As Fig. 9.2 shows, for the period 2004–2013, it reached a

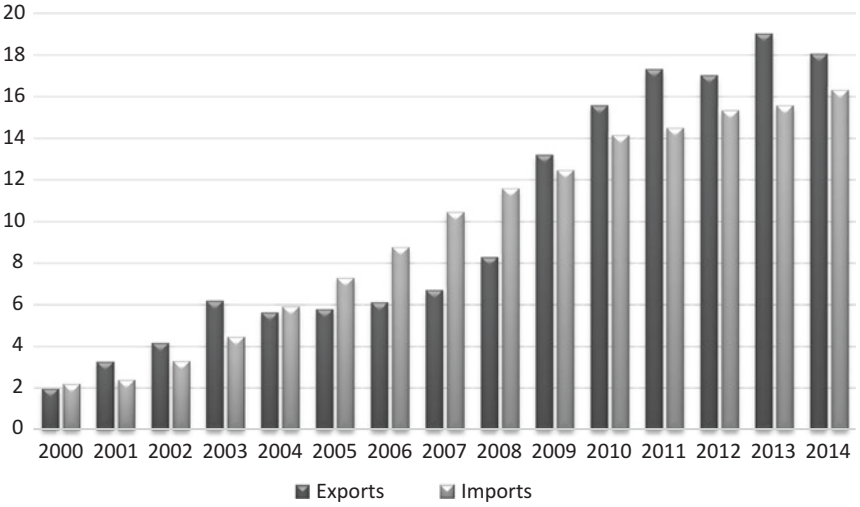

Fig. 9.1 Brazil's exports and imports from China as a percentage of total trade, 2000–2014. (Source: Authors' elaboration based on World Bank data)

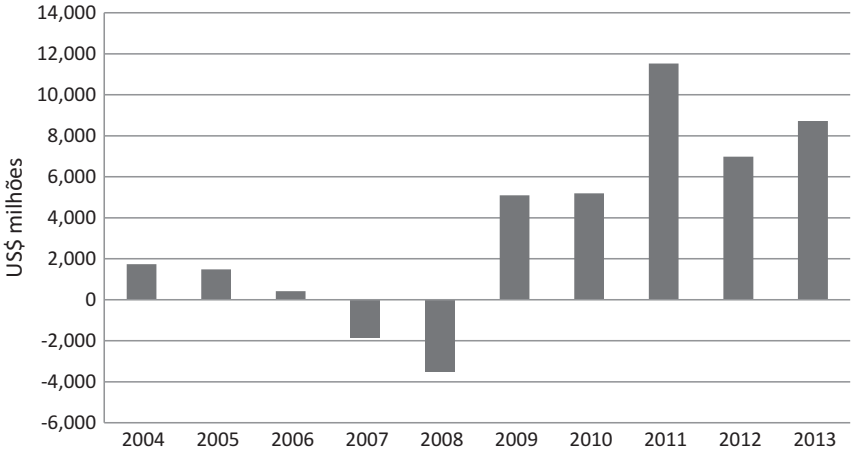

Fig. 9.2 Brazil's trade balance with China, 2004–2013 (USD million). (Source: Ministry of Development, Industry and Foreign Trade (MDIC – Brazil). Elaboration: China-Brazil Business Council)

surplus peak of USD 11.5 billion in 2011, with only unfavorable results in 2007 and 2008, years near the international financial crisis that started at the subprime lending sector in the US.

It is important to analyze the year 2014 separately since it marks the beginning of the drop in the commodity prices. For this year, the trade flow totaled USD 77.9 billion, reflecting a decrease of 6% over the previous year, even though it represents the second best result of the entire series. Exports totaled USD 40.6 billion, a 12% decline when compared to 2013; meanwhile, imports totaled USD 37.3 billion, reflecting a slight increase of 0.1% for the same period. With these results, the balance of trade between the two nations ended the year 2014 with USD 3.2 billion favorable to Brazil. The reduction in the value of Brazil's exports to China in 2014 took place mainly because of the downward trend in international prices of major commodities exported by the country.

In general, the pattern of Brazilian exports to the Asian country in 2014 remained the same as in previous years. As Table 9.1 shows, sales to China are mainly in soybeans, iron ore, and raw oil, which together represent 79.8% of exports. Meanwhile, imports from China were concentrated in electrical and mechanical machinery, which together accounted for 48.4% of total imports. Hence, while exports are mainly in natural resources with low value added and there is a very small diversification, imports are mostly in manufactures and they present a much higher heterogeneity.

It can be said that Brazilian exports high reliance on natural resources is a non-desirable characteristic of this relationship. In 2014 and 2015, for instance, the commodities prices experienced a sharp decline. This feature is very unlikely to occur with manufactured goods, which tend to present much less price volatility. Figure 9.3 shows Brazilian export data to China for a 13-year period. It is possible to observe the evolution of the four principal products and how they increased their participation on the exports in a much faster way than the others did.

Lastly, even with the recent drop in the price of Brazil's main export commodities, Brazil's trade balance with China is still positive. Conversely, the country faces a trade deficit with other global players, such as the US and the European Union, markets in which Brazil closed 2014 with negative trade results of USD 7.9 billion and USD 4.6 billion, respectively.

Table 9.1 Brazil's exports and imports from China by product, 2014

Exports	USD (million)	Share of total exports (%)	Imports	USD (million)	Share of total imports (%)
Soybeans	16.615	40.9	Electrical machinery and equipment	10.897	29.2
Iron ore	12.303	30.3	Mechanical machinery and appliances	7.151	19.2
Petroleum oils and oils	3.473	8.6	Organic chemicals	2.230	6.0
Pulp	1.424	3.5	Iron and steel	1.388	3.7
Sugar	880	2.2	Plastics and articles thereof	1.070	2.9
Hides and Skins	554	1.4	Motor vehicles, tractors, cycles and parts	1.002	2.7
Poultry	519	1.3	Works of iron or steel	978	2.6
Iron alloys	504	1.2	Apparel and clothing accessories, not knitted or crocheted	935	2.5
Soybean oil	340	0.8	Synthetic or artificial filament	809	2.2
Tobacco	334	0.8	Optical instruments; Medical and surgical instruments	780	2.1
Cotton	333	0.8	Fertilizers	681	1.8
Other	3.338	8.2	Other	9.356	25.1

Source: Authors' elaboration based on data from the Brazilian Ministry of Development, Industry and Foreign Trade

9.3 Chinese Investments and Loans to Brazil

The Sino-Brazilian economic relationship advanced not only in trade but in other areas such as investment and loans as well. In this sense, in 2004 the Sino-Brazilian Commission for High-Level Coordination and Cooperation (COSBAN) was established—a formal mechanism focused

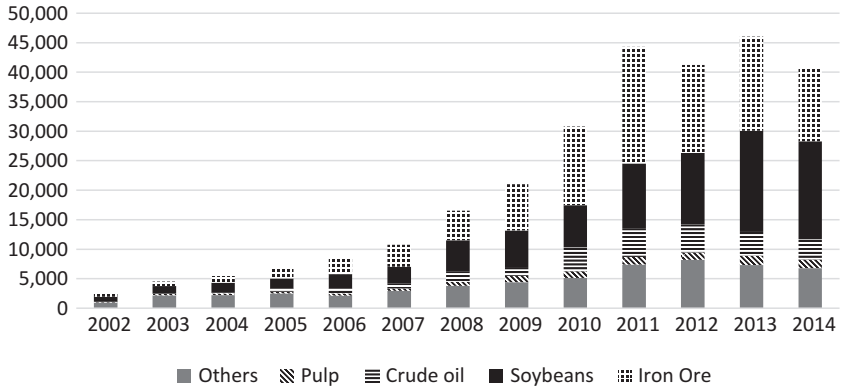

Fig. 9.3 Exports from Brazil to China, USD million (2002–2014). (Source: Ministry of Development, Industry and Foreign Trade (MDIC – Brazil). Elaboration: China-Brazil Business Council)

on the monitoring and implementation of the bilateral agenda. COSBAN consists of 11 subcommittees and 6 working groups dedicated to the primary sectors of mutual interest. The High-level Committee is also responsible for monitoring the Joint Action Plan 2010–2014, signed in 2010 by Presidents Lula and Hu Jintao, as well as the Ten-Year Plan of Brazil-China Cooperation (2012–2021), signed by President Dilma Rousseff and Prime Minister Wen Jiabao in April 2011.

The Joint Action Plan establishes objectives, goals, and guidelines for bilateral cooperation and seeks to improve the coordination and performance of existing mechanisms, as well as expand and deepen exchanges in the political, economic, agricultural, industrial, technological, and cultural areas. The plan had the following main objectives: (1) plan a medium and long-term strategy for the relationship; (2) promote the complementarity between the two economies; (3) identify potential barriers to the relationship growth; and (4) diversify the economic and trade relationship aiming at areas such as science, technology, and innovation.

As a way to complement the Joint Action Plan, the leaders of the two countries formalized the creation of the Ten-Year Plan for Brazil-China cooperation. Its aims are to signal the priority areas and key projects in science, technology, and innovation; economic cooperation; and exchanges between peoples, in the period 2012–2021.

As a result of this expansion, between 2007 and 2013, an amount of USD 56.5 billion was accounted in Chinese investments announced in Brazil, marking a new phase in the bilateral relationship (CBBC 2013). Besides, in the recent years, Chinese companies have started to diversify their investments—highly concentrated on natural resources—reaching the industry sector, especially in the areas of machinery and equipment, electronics, and automotive, with new flows in the service sector, particularly in finance.

During this period, there was also the presence of Brazilian investments in China. Companies like Vale, Petrobras, and Embraco were pioneers in presence in the Asian country. In more recent years, there is a movement of Brazilian investments in China with new companies such as BRF and Suzano in agribusiness, Weg in the machinery area, and the Bank of Brazil (BB) in banking being the first Latin American financial institution to open an agency in China (Bustelo and Reis 2015).

The diversification of Chinese investments in Brazil are very welcome since the pattern that was more dominant in the first years of the twenty-first century were credits and Foreign Direct Investment (FDI) in areas related to natural resources. Both investments and loans have been used to develop sectors that are heavily linked to growing export demands. The strategy is clear: China provides loans to foster their productivity in sectors that are of their interest. In this way, they can continue to trade and benefit from cheaper and faster raw materials due to productivity gains.

In fact, China's policy banks have become the largest annual public creditors to LAC (Latin America and the Caribbean) governments. Chinese finance to the LAC region has risen sharply in the last few years, from USD 4.8 billion in 2007 to USD 22.1 billion in 2014. In 2014, for instance, Chinese finance to the region was more than finance to the region provided by the World Bank and the Inter-American Development Bank combined (Ray and Gallagher 2015).

There are several different sources for the Chinese loans to Latin America and Brazil, and the information is divergent. This happens due to the nature of these bilateral agreements and the fact that description is an important part of some businesses, especially in strategic sectors. In this sense, we decided to use as source one of the leading databases for the topic, the China-Latin America Finance Database (Gallagher and Myers 2014). The data in Table 9.2 shows that in the ten-year-period 2005–2014,

Table 9.2 Chinese loans to Brazil (2005–2014)

Year	Type	Purpose	Lender	Amount
2005	Mining	Steel mill equipment	ICBC	201M
2007	Energy	GASENE pipeline	China Development Bank	750M
2009	Infrastructure	Expand Telemar network	China Development Bank	300M
2009	Energy	Pre-salt oil field development	China Development Bank	10B
2010	Mining	Ships to transport iron ore to China	Bank of China and China Ex-Im Bank	1.2B
2011	Energy	Pre-salt operations	Sinopec	390M
2012	Infrastructure	3G network	China Development Bank	500M
2014	Other	Finance Vale purchase of equipment & services	China Ex-Im Bank	5B
2014	Other	Finance Vale purchase of financial services	Bank of China	2.5B
2014	Energy	Finance Schahin Group lease of drilling rigs	ICBC	1.1B

Source: Authors' elaboration based on the China-Latin America Finance Database (Gallagher and Myers 2014)

China made ten loans to Brazil with the total amount of USD 22 billion. A set of different lenders, including the China Development Bank (CDB), China Ex-Im Bank and the Industrial and Commercial Bank of China (ICBC), made the loans. The data for 2015 is not available yet, but it is already possible to say that it might be one of the years with higher disbursements. For instance, Petrobras, the giant state-controlled company received two credit lines from the CDB and the China's Export-Import Bank of USD 3.5 billion each, totaling USD 7 billion in loans until September (Pinto 2015).

As said before, it is expected that with the new joint initiatives between the countries, the Chinese loans and investments in Brazil will be more diversified, not relying only on natural resource businesses. This will be good for both sides. For Brazil, it is an opportunity to advance sectors of more high value-added products and diminish its dependency on the commodity prices. For China, as Pinto (2015) points out, it can diminish its exposure to riskier clients highly affected by the commodity market.

In this sense, a desirable long-term strategy for the Chinese investors demands more diversified portfolios.

The last two sections discussed the recent economic trends in the Sino-Brazilian relationship, focusing on trade and investments/loans. However, the scenario—high commodity prices, two-digit GDP growth in China and so on—when these changes occurred are not likely to be seen again in the future. China is facing a transition from a poor to a middle-income country in terms of GPD per capita, and as all other developing countries at that stage, needs to make reforms and rebalance its growth in order to keep with its social and economic development. The next section analyzes some of these challenges and, finally, Sect. 9.5, discusses the future of this relationship based on the perspective scenario for China.

9.4 The "New Chinese Economy": Structural Reforms and Main Challenges

A nation of 1.3 billion people, China holds the largest population in the globe and has recently become the world's biggest economy (when measured in purchasing power parity (PPP) terms), which pushes the country to increase its role in the global economy. After almost three decades since the beginning of market-oriented reforms, China has been one of the world's fastest-growing economies, having more than quadrupled its per capita real incomes in the last two decades.

Despite still being one of the fastest-growing economies in the world, the Chinese economy is experiencing a recent slowdown. Growth rates declined from almost 15% before 2008 to roughly 7% in the past few years. In fact, China faced its smallest growth rate in the last 24 years, 7.4%. Additionally, according to IMF data,[2] China's growth is expected to be 6.8% in 2015 and to average 6.2% per year between 2016 and 2020.

There are many factors behind this trend. First, a reduction in the demand for its exports from key markets such as the US and the European Union. Second, China is rebalancing, shifting from an investment-led growth model, with emphasis on exports competitiveness, to a model

where the demand plays a more significant role—even though it cannot be characterized as demand-led growth. Third, China is experiencing a common challenge that faces most of the developing countries after they achieve a certain development stage, that is, the so-called "middle-income trap", which will likely pose a significant challenge for China moving forward. Hence, this slowdown, combined with the new pattern and dynamic of growth, can represent a watershed in the Chinese relationship with Brazil.

The impressive economic performance had some important features. One of the most distinctive characteristics of the Chinese economic spur in recent decades is the country's investment rate. China presented, on average, 41.6% of investment as a percentage of GDP during the period 1990–2013. The very high investment rate is possible due to China's extraordinary internal rate of savings. For instance, in 2013, China presented a savings rate of 51% of the GDP. These numbers were accompanied by a structural current account surplus that reached 10% in 2007. After 2009, however, the current account positive result diminished, reaching 2.02% of GDP in 2014.

These numbers show a very imbalanced economy, with too much investment and low household consumption. Besides, the export-led model growth adopted cannot be kept if there are no countries enabled to absorb the huge current account surpluses that the Chinese economy displayed. In fact, due to the size of the Chinese economy, large countries should run deficit current accounts to match its surpluses, and since the US and the Eurozone are trying to reach a more balanced result, this option is not available anymore. As Yang (2014) points out, China's rebalancing is apparent, first, in the export sector. Export growth has slowed down from an average of 29% per year during 2001–2008 to less than 10% annually, making foreign demand a far less critical engine of growth.

It is important to note that the slowdown should not seem as surprising. It is natural for countries that achieve a middle-income level to diminish their pace of growth. When this occurs, the countries face two different futures. The first is to make reforms, change its development strategy, and keep growing to reach the rich countries' per capita income, in a traditional catching-up story. The other, and, unfortunately, the case

of Brazil for some years already, is to remain in the "middle-income trap", a situation where the country is not able to continue its process of catching up and remains in a stop-and-go growth pattern, stopping its catching-up process for years and even decades.

One of the structural factors responsible for the slowdown of the Chinese economy is the aging population. The share of working-age people (16–65 years old) in the total population has been declining since its 2010's peak of 72%. Moreover, the absolute number of working-age people has been falling since 2012. For instance, the population within working age shrank by 2.44 million in 2013. Not only is the share of working-age people declining but also the pace at which the population is growing is rapidly diminishing too. For instance, in the period 2000–13, the Chinese population grew per year at 0.53%, on average while other developing countries as India and Brazil presented 1.43% and 1.08% in the same indicator for that period.

At the same time, China is undergoing rapid urbanization. From 1980 until 2014, the rural population in China dropped from 80% to 45.5% of the total population.[3] With less than 60% living in urban areas, the migration process is unlikely to be over, but it can be said that the most dynamic phase of China's transformation to an urban society is complete.

As in many developing countries when the transition from rural to urban area starts, China's large pool of surplus rural labor has played a key role in maintaining low inflation and supporting China's growth model. As the flow of low-paid migrants into Chinese factories slows, workers demand higher pay, affecting the real costs. This is a well-known problem among middle-income developing countries and is referred to as Lewis Turning Point (LTP). According to Lewis (1954), in an economy with excess labor in a low-productivity sector (agriculture, in this case), wage increases in the most productive sector (industry) are limited by wages in the less productive sector, as labor moves from the farms to industry. In this sense, when the surplus labor is diminished, the wages rise faster, catching up with the expected wages in full employment, resulting in falling investments and reduced profits. At this point, the economy is said to have crossed the LTP. Even though it is different to determine the point

exactly, some estimations indicate that the economy will reach this point until 2020 while others said that this process already happened.[4]

Besides the demographic changes, there is a shift in production. In 2013, China's output of services, which contributed with 46% to total GDP, finally eclipsed the output of its industry (44%). This indicates that the rebalancing between consumption and investment is happening slowly, but this might keep occurring in the next years and decades.

Lastly, we can stress the role of the finance system in the Chinese growth. Credit took a vital role to keep the economy growing at a fast pace. In this context, with credit rising to 200% of GDP and average financing costs nearing 7%, Chinese borrowers now need to generate cash flow growth of 14% to cover their interest payments without eroding their profitability or being forced to borrow even more (Bustelo and Reis 2015).

Besides, although bank loans still account for the majority of credit provided to China's real sector, other channels of credit extension are growing rapidly. Credit extension activities outside commercial banks' balance sheets are referred to as shadow banking. The shadow banking system (SBS) operates at the margins of financial regulation and tends to involve complex and thick chains of intermediation. The rapid growth of the SBS in China presents a challenge for the regulators. Elliott and Qiao (2015) observe that even though the current size of the SBS in China depends on the definition of shadow banking and estimates of relevant statistics, some estimations in the recent past produced figures ranging from about RMB 5 trillion to RMB 46 trillion, or roughly 8–80% of the size of China's GDP.

Another point that raises concerns is the Chinese stock market. After experiencing a robust increase in the recent years, the stock market adjusted very sharply in mid-2015. The Chinese stock market crash began with the popping of the stock market bubble on 12 June 2015. By 8–9 July 2015, the Shanghai stock market had fallen 30% over three weeks as 1400 companies, or more than half of the listed companies, filed for a trading halt in an attempt to prevent further losses (Duggan 2015).

Hence, there are many indicators that show that the financial system in China can pose some complex threats for the economy. The stock market, the SBS, and the fast pace of credit growth are some of the issues

that should be addressed by the government to avoid a grave financial crisis that can spur Chinese growth. The necessity of adjustments meant a slowdown in the financial sector growth in China that will affect real economic growth, bringing down the potential growth of the country in the short and medium run.

This section concludes that the growth pattern of the Chinese economy at the beginning of the twenty-first century will not be seen again in the future. The country is looking for a more sustainable growth pattern, with a balance between investment and consumption, lower reliance on financial instruments as the credit to growth and facing structural changes as the demographics one. In this scenario, the question is: How the Sino-Brazilian economic relationship can evolve in the next years in face of the ongoing transformations of the Chinese economy? The next section tries to answer this question presenting the concluding remarks.

9.5 Concluding Remarks

In recent years, the relationship between Brazil and China has undergone profound changes that led the Asian giant to become today a leading economic partner for Brazil. In this sense, the success of current Chinese transformations and structural reforms can, as the ongoing changes, open up new opportunities to enhance and diversify this relationship in the coming decades.

From a general point of view, the reforms are essential to ensure a new cycle of growth and openness in the Asian country. Although growing at a lower rate, China should maintain a central role in the recovery of the world economy and increased global trade. The expansion of the already high degree of openness and changes in its production structure will make China an even more significant partner for countries such as Brazil. In this sense, the rebalancing of the Chinese economy, raising domestic consumption as the main engine of growth, will open new opportunities for Brazil's exports and investments.

For instance, in the food sector, it is expected that the emergence of a new Chinese middle class will bring gains for Brazilian agribusiness exports, following not only the increased demand but also the rise of the

Chinese consumer expectations for quality standards and healthy food products. Another example comes from the Chinese government's efforts in restructuring and modernization of its national health system—following the demographic transition and aging population—must give rise to new business prospects with China. If confirmed, demands in the areas of machinery, medical equipment and devices, and dental treatment inaugurate a potential market for Brazilian companies. In this sense, it is up to Brazil to be proactive and establish a strategy that considers the windows of opportunity and profitable niches that are rising in the "new China".

Besides, the outstanding current account surplus experienced by China in the last decade resulted in a massive accumulation of international reserves. China had, in June of 2015, USD 3.7 billion in foreign exchange reserves. This puts China in a unique position in the global scenario regarding financing capacity and access to currency reserves. In that sense, it should be expected that China would not face, at least in the short or medium-term scenarios, a balance of payment crisis. Also, and more importantly, China can increase its participation in the international economy by loaning to other emerging markets and by increasing its FDI participation. Lastly, the pool of foreign reserves allows China to pursue countercyclical economic policies when an international crisis hits, avoiding the economic slowdown through an injection of government spending in the economy. Furthermore, China can credit channels to other developing countries to pursue their own countercyclical policies as well. Indeed, as Pinto (2015) points out, a Brazilian public bank, Caixa Economica Federal and the ICBC are already cooperating to create and manage a USD 20 billion fund to finance infrastructure in Brazil, and another USD 20 billion fund to finance investment and cooperation in production capacity are being discussed by the governments in mid-2015.

Summing up, the chapter concludes that the Chinese rapid growth of the last decades profoundly changed the relationship between this nation and Brazil. The new economic perspectives for China—lower growth and being more demand driven—can represent a watershed in this relationship, and it is necessary that Brazil prepares itself for this new phase to strengthen the partnership with the Asian giant. A failure to understand these changes and rely on the path dependence brought by the growing

relationship in the last decade can be harmful. However, by starting now a strategic agenda for economic cooperation within China's new growth scenario can deepen the partnership and advance the perspectives of sustainable and fruitful South-South partnership between Brazil and China.

Notes

1. According to Gallagher and Porzecanski (2010), China competition in manufactures in the last decade affected Latin American manufacturers in a significant way. The authors estimated that approximately 92% of the region's manufacturing exports were under the threat of Chinese competition. Since the region was not able to compete with cheap Chinese manufacture exports, the fact generated even the worry that the ability of the region to generate long-term economic growth would be impacted by the reprimarization of its productive structure due to the "forced deindustrialization" posed by the Chinese competition.
2. The *World Economic Outlook* (WEO). Database from April 2015. Retrieved from: http://www.imf.org/external/pubs/ft/weo/2015/01/. Accessed on 10 May 2015.
3. World Bank Development Indicators. Data accessed at on 10 May 2015.
4. Das and N'Diaye (2013) estimate that China is very close to it and will reach the Lewis Turning Point (LTP) between 2020 and 2025. Others believe that China has already passed its "Lewis Point", and the main indicator for that is the fast increase in real wages.

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10

Balance-of-Payments Constrained Growth Model: The Brazilian Case over the Period 1980–2011

Rafael Saulo Marques Ribeiro

10.1 Introduction

This chapter seeks to verify empirically whether the Brazilian growth over the last three decades is balance-of-payments constrained or not. In order to accomplish such a task, we shall base our theoretical analysis on the Balance-of-Payments Constrained Growth Model (BPC) first developed by Thirlwall in 1979. Thirlwall's Law claims that the home country growth compatible with the current account balance is essentially determined by its exports growth rate and its income elasticity of demand for imports ratio. Provided a constant elasticities ratio over time, in the end what we really want to evaluate is if there is any long-term relation between the Brazilian

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growth rate and its exports growth rate during the given period. Wherefore, we will test the cointegration hypothesis, that is, the long-run relation aforementioned, through both Johansen and Engle-Granger techniques.

Many other works testing Thirlwall's Law for the Brazilian case have been accomplished. López and Cruz (2000) and Pacheco-Lopez and Thirlwall (2006) explored the 1965–1995 and 1977–2002 periods, respectively. Jayme Jr (2003) also tested the model but from 1955 to 1998, which includes the Imports Substitution Industrialisation (ISI) years. More recently, Carvalho and Lima (2009) tested the model validity from 1930 to 2004. We can say that all these works confirm that the Brazilian growth is balance-of-payments constrained in the long term and therefore well described and predicted by Thirlwall's Law.

Nonetheless, more than 30 years have gone since the decay of the ISI model in 1979, and no attempt of testing the Law has been made so far by taking into account only the post-ISI period until the present day. This is a point of paramount importance, for during the 1980s, Brazil brusquely switched from an inward-orientation to an outward-orientation macroeconomic policy strategy and gradually climbed the ladder towards the neoliberal agenda in the 1990s laid out by the Washington Consensus. Moreover, this work stretches its time series a little further ahead than the previous essays in this literature and goes until 2011. This is of greatest significance, for the rebirth of the Brazilian economy took place in the 2000 decade. By considering only the post-ISI period, we intend to point out the distinctions and gains to the analysis of the Brazilian growth during the past years in relation to the other works that allow entirely different historical moments into their datasets and hence obtain a much more comprehensive time periods—but not necessarily longer time series—for the sake of the econometric model. And last but not the least, this work also tackles methodological issues on applied econometrics. In order to test Thirlwall's Law, econometricians have widely used Johansen cointegration procedures at the expense of Engle-Granger methods, regardless of the sample size. The last 30-year Brazilian time series show that this choice between cointegration tests is not that straightforward and, even though the Johansen test is statistically more efficient, for small samples—around 100 observations—we might be better off with the Engle-Granger method as it provides a faster convergence of the due parameters.

In the next section, we present the BPC growth model developed by Thirlwall and Hussain (1982) as this version extends the standard BPC growth model by allowing the financial account into the balance-of-payments identity. In Sect. 10.3, we discuss the Brazilian history from 1980 to 2010. In Sect. 10.4, we present the econometric model. And in the last section, we summarise the conclusions of the chapter.

10.2 The Balance-of-Payments Constrained Growth Model

This section presents the BPC growth model originally developed by Thirlwall in 1979. The model assumes that the global economy consists of basically two different countries: a richer foreign country and a poorer home country. The foreign country is a large economy that issues the international currency, and the home country is a small economy facing a balance-of-payments constraint in the long run. It is also assumed that both countries are one-sector economies that produce and export only one sort of consumption good, and there is imperfect substitutability between the foreign and domestic consumption goods. Here, we will present the extended version allowing the financial account into the balance-of-payments identity by Thirlwall and Hussain (1982) and McCombie and Thirlwall (1994). This framework assumes that the home country is not able to finance a sustainable positive ratio of the current account deficit to GDP over time, thus implying that in the long run real imports must be equal to real imports. The expression of the balance-of-payments identity is given by

$$P_d X + P_d F = P_f ME \tag{10.1}$$

where X is real exports, M is real imports, $F > 0$ is real capital inflow (if $F < 0$, then F stands for capital outflow), P_d is the price of domestic goods, P_f is the price of foreign goods in foreign currency, and E is the money exchange rate measured as the foreign prices in domestic currency.

Taking the rate of change[1] from (10.1)

$$\theta\left(p_d + x\right) + \left(1-\theta\right)\left(p_d + f\right) = p_f + m + e \tag{10.2}$$

where $\theta = P_dX/P_fME$ and $(1 - \theta) = P_dF/P_fME$ are exports and capital inflow shares on imports, respectively. The lower-case letters stand for the growth rates of their respective variables in level. Using a multiplicative import demand function, we have

$$M = \left(\frac{P_f E}{P_d}\right)^{\psi} Y^{\pi} \qquad \psi < 0, \pi > 0 \tag{10.3}$$

$$X = \left(\frac{P_d}{P_f E}\right)^{\eta} Z^{\varepsilon} \qquad \eta < 0, \varepsilon > 0 \tag{10.4}$$

where Y is the real output of the home country, Z is the real output of the foreign country, $\psi < 0$ is the price elasticity of demand for imports, $\pi > 0$ is the income elasticity of demand for imports, $\eta < 0$ is the price elasticity of demand for exports, and $\varepsilon > 0$ is the income elasticity of demand for exports. In rates of change

$$m = \psi\left(p_f + e - p_d\right) + \pi y \tag{10.5}$$

$$x = \eta\left(p_d - p_f - e_t\right) + \varepsilon z \tag{10.6}$$

Substituting (10.5) and (10.6) in (10.2) and rearranging the terms, we have the rate of growth consistent with balance-of-payments equilibrium

$$y = \frac{\theta\varepsilon z + \left(1-\theta\right) f + \left(1 + \theta\eta + \psi\right)\left(p_d - p_f - e\right)}{\pi} \tag{10.7}$$

Remembering the signs of the parameters ($\eta < 0, \psi < 0, \varepsilon > 0, \pi > 0$), we can draw some conclusions from the Eq. (10.7). Firstly, a real exchange

rate devaluation ($e + p_f - p_d > 0$) boosts the balance-of-payments equilibrium growth rate, given that the sum of the price elasticities of demand for exports and imports in absolute value is greater than unity, that is, $(1 + \theta\eta + \psi) > 0$.[2] Secondly, the home country growth rate (y) depends on the foreign country growth rate (z). And thirdly, increase in the growth of capital inflows can finance domestic consumption and investments and hence boost the home country growth rate.

If the relative prices remain unchanged in the long run mostly due to wage resistance, then ($p_d - p_f - e = 0$). Empirical studies also strongly suggest that price elasticities are rather low or statistically non-significant (Moreno-Brid 1999; Moreno-Brid and Pérez 1999; Léon-Ledesma 2002; Perraton 2003; Razmi 2005; Carvalho and Lima 2009; Gouvea and Lima 2013). Moreover, if an ever-increasing trade deficit is unsustainable over the long run, then f is equal to zero and θ is equal to unity, in which case, Eq. (10.7) reduces to

$$y = \frac{\varepsilon z}{\pi} = \frac{x}{\pi} \tag{10.8}$$

This result states that the balance-of-payments equilibrium growth rate is determined by the growth rate of the foreign demand and by income elasticities of demand for exports and imports ratio. Equation (10.8) is the so-called Thirlwall's Law. This law states that a country's output growth rate depends positively on its existing non-price competition factors, here expressed by the ratio ε/π. This ratio reflects disparities between countries with respect to factors determining the demand for a country's exports and imports, such as technological capabilities, product quality, stock of knowledge, and consumer preferences, for instance. Alternatively, we can say that the greater the complexity and the technological content of the home country's imports (exports), that is, the higher the elasticity π (ε), the lower (higher) the home country's equilibrium growth rate. Ergo, in light of the balance-of-payments constrained growth model, the ISI strategy largely employed by Latin American countries over the twentieth century can be understood as an attempt to promote policies and create incentives for domestic industrialisation that could ultimately lead to an increase in the trade elasticities ratio, ε/π.

10.3 Notes on the Brazilian Economic History During the Past Decades

In the Brazilian economy, the ISI period goes from 1930, notably marked by the rise of deliberate industrial policies pushed forward by President Vargas, until 1979 and the end of the implementation of the Second National Development Plan. The chief goal of the ISI policy was to change the specialisation pattern of the country's economy through industrialisation by reducing its external constraints and, consequently, its dependency with respect to the developed countries. As contributing factors, we may say, by the end of this period, the country developed a fairly complex social structure and a relatively powerful domestic market that together were capable of serving as the very engine of its economic growth. On the other hand, the technology gap in relation to the developed countries did not diminish, and Brazil started facing a severe competition against Eastern Asian countries in foreign trade.

In the 1980s, due to the oil crisis in the previous decade, the rise in the international interest rates and the debt crisis in several countries, including Brazil itself, the ISI development pattern led by the state was put aside. Meaningful currency undervaluations and strong fiscal austerity measures took place in order to cope with slashing balance-of-payments misalignments caused by the blunt interruption in foreign capital inflows. The inward-orientation development pattern from the ISI period was replaced by the outward-orientation pattern wherein economic growth is driven by exports instead of domestic absorption.

In such a troubled context of worldwide instability, fiscal budget deficit, and the utter state of bankruptcy, a strong conservative turn in the theoretical field laid out by the Washington Consensus in 1989 took place. This document listed a set of neoliberal economic policy prescriptions that should be adopted by crisis-wracked undeveloped countries in order to be pulled out of their sorry plight and placed back into a sustainable path of growth and development. The cluster of strongly market-based reforms implemented in Brazil throughout the 1990s was heavily determined by the guidelines of such a document. This decade was chiefly marked, within the economic sphere, by a wide international trade openness, financial deregulation, and privatisation. The state was no longer in charge of promoting growth and development. On the one hand, the implementation of these

reforms and the government's commitment to remain loyal to the orthodox agenda augmented considerably the capital inflow and the insertion of the country in the international financial market. On the other hand, the maintenance of such a pattern raised the country's external fragility and vulnerability, thereby leading to a balance-of-payments crisis in 1999 and hence forcing the government to undervalue its currency.

In the dawn of the 2000s, the economy was stagnated. While still recovering from the 1999 crisis, Brazil had to struggle with extrinsic conditions such as the Argentinian crisis and the 9/11 attacks, both in 2001. From the mid-2000s onwards, however, the Brazilian economy started growing sharply. Within the domestic sphere, such a growth was basically driven by the household final consumption expenditure due to a credit expansion and a reduction in the income inequality. With respect to the foreign trade, Brazilian exports were boosted by the combination of a heated Chinese economy and a rise in the international prices of commodities. Such a turn of events allowed the country to unprecedentedly reach at the same time high rates of growth and trade surplus for a meaningful span of time. Besides, in spite of the increasing domestic consumption of imported electronic gadgets and devices over the past years, the pressure exerted by these goods on the Brazilian current account was eased by their diminishing prices around the world. As a result, we have reasons to believe this twenty-first century world, wherein commodities are getting increasingly more expensive whereas high-tech products are undergoing a process of "commoditisation" due to their ever-diminishing prices, is an entirely and substantially different world from the one which we used to know in the past and therefore deserves to be analysed more closely. Therein lies the importance of considering the whole 2000s decade in the data series.

10.4 Empirical Analysis of the Brazilian Case

10.4.1 Data and Methodology

The following model makes use of quarterly time series data for Brazilian GDP and exports (FOB) from the first trimester of 1980 (1980 T1) until the first trimester of 2011 (2011 T1) amounting to a sample of 125 observations. The GDP values were deflated by the Extended National

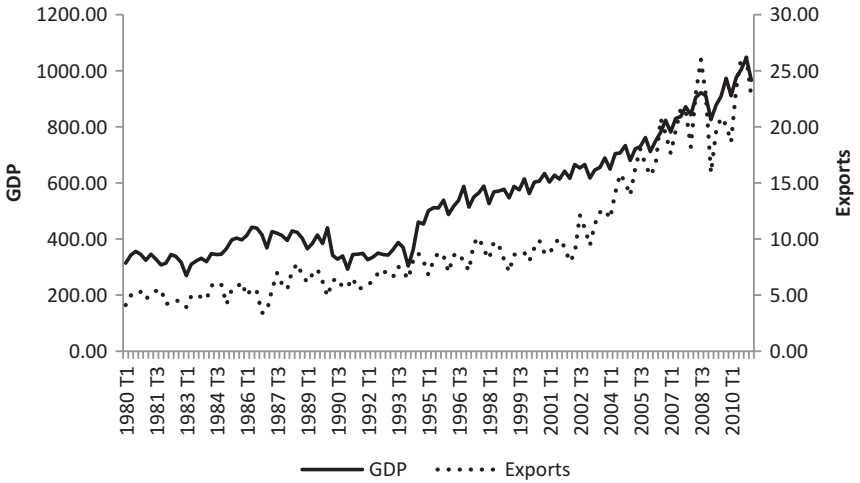

Fig. 10.1 Quarterly time series data for real GDP and real exports (in thousands)

Consumer Price Index (IPCA), whereas the exports values were deflated by the US Wholesale Price Index as a *proxy* to a price index for tradables. All the data were obtained from the Brazilian Institute of Applied Economic Research (IPEA) website and can be visualised in Fig. 10.1.

In this chapter, we apply the same methodology used by Atesoglu (1997) and Jayme Jr (2003). The very idea of this methodology is basically trying to estimate the integration coefficient from the long-term relation, if there is any, between the natural logarithms of both GDP and exports time series. Such a coefficient, namely the implicit elasticity, is nothing but the inverse of the income elasticity of demand for imports.

Once macroeconomic variables usually present a stochastic and non-stationary behaviour over time, Ordinary Least Squares (OLS) traditional econometric techniques generate spurious regressions when it comes to time series and, therefore, are incapable of reliably showing a long-term relationship that could ever possibly exist, if it does exist indeed, between different variables. According to the time series literature, the most correct estimation method in this case would be the cointegration technique.

A formal definition of cointegration was given by Engle and Granger (1987).[3] The definition is the following:

Consider v_t a vector of variables. The components of the vector $v_t = (v_{1t}, v_{2t}, \ldots, v_{nt})'$ are said to be cointegrated of order d, b, where $d > 0$ and $b > 0$ and v_t is denoted by $v_t \sim CI(d, b)$ if

1. All the variables of v_t have the order of integration equal to d.
2. There is a vector $\beta = (\beta_1, \beta_2, \ldots, \beta_n)\ \forall\ n$, such as the linear combination $\beta v_t = \beta_1 v_{1t} + \beta_2 v_{2t} + \ldots + \beta_n v_{nt}$ is integrated of order $(d - b)$.

In practical terms, assuming that the real GDP Y_t and the real exports X_t are integrated of order d, whether the vector $\beta = (1, \beta_X)$ from $Y_t = \beta_X X_t + \varepsilon_t$ is statistically meaningful, then ε_t must be integrated of order $(d - b)$. Therefore, the first step is accomplishing a test in order to detect if there is a unit root in the time series Y_t and X_t. We deseasonalised the quarterly data by the Census X12 method and then we took natural logarithms of Y_t and X_t. Accordingly, we applied the Augmented Dickey-Fuller (ADF) test. The null hypothesis (H_0) claims the existence of a unit root cannot be rejected. Following the method laid out in Enders (2010), we show the ADF test results later in Tables 10.1 and 10.2. As we can see, the test statistics do not reject the null hypothesis indicating the existence of unit root in both series. Our next step is accomplishing the cointegration test.

The cointegration analysis allows us to say if there is any long-term relation between variables which, in our case, are GDP and exports. There are basically two different methods of testing any likely existence or not of cointegration between variables, namely the Engle-Granger method relying on a modified OLS estimation and the Johansen method which is based on the maximum-likelihood estimation technique. We shall start with the Johansen test, as widely suggested by this literature. As the sample size increases to infinity, the maximum-likelihood estimations fulfil the properties of consistency, asymptotic normality, and efficiency.[4] However, its speed of convergence towards the true population parameter value is rather slow and, consequently, requires sufficiently large samples in order to obtain reasonable results.

Table 10.1 ADF test for lnY of order 1(SIC)

Model	Hypothesis	Test statistic	Critical values for a 95% confidence interval
$\Delta lnY_t = a_0 + \gamma lnY_{t-1} + a_2 t + \varepsilon_t$	$\gamma = 0$	$\tau_\tau = -2.16598$	$\tau_\tau^* = -3.446$(do not rej.H_0)
	$\gamma = a_2 = 0$	$\phi_3 = 2.875294$	$\phi_3^* = 6.49$(do not rej.H_0)
	$a_0 = \gamma = a_2 = 0$	$\phi_2 = 3.598207$	$\phi_2^* = 4.88$(do not rej.H_0)
$\Delta lnY_t = a_0 + \gamma lnY_{t-1} + \varepsilon_t$	$\gamma = 0$	$\tau_\mu = 0.183002$	$\tau_\mu^* = -2.885$(do not rej.H_0)
	$a_0 = \gamma = 0$	$\phi_1 = 2.465089$	$\phi_1^* = 4.71$(do not rej.H_0)
$\Delta lnY_t = \gamma lnY_{t-1} + \varepsilon_t$	$\gamma = 0$	$\tau = 2.198457$	$\tau^* = -1.943$(do not rej.H_0)

Table 10.2 ADF test for *lnX* of order 1(fixed)

Model	Hypothesis	Test statistic	Critical values for a 95% confidence interval
$\Delta lnX_t = a_0 + \gamma lnX_{t-1} + a_2 t + \varepsilon_t$	$\gamma = 0$	$\tau_\tau = -2.65872$	$\tau_\tau^* = -3.446$ (do not rej. H_0)
	$\gamma = a_2 = 0$	$\phi_3 = 4.282073$	$\phi_3^* = 6.49$ (do not rej. H_0)
	$a_0 = \gamma = a_2 = 0$	$\phi_2 = 4.119093$	$\phi_2^* = 4.88$ (do not rej. H_0)
$\Delta lnX_t = a_0 + \gamma lnX_{t-1} + \varepsilon_t$	$\gamma = 0$	$\tau_\mu = 0.234222$	$\tau_\mu^* = -2.885$ (do not rej. H_0)
	$a_0 = \gamma = 0$	$\phi_1 = 1.82898$	$\phi_1^* = 4.71$ (do not rej. H_0)
$\Delta lnX_t = \gamma lnX_{t-1} + \varepsilon_t$	$\gamma = 0$	$\tau = 1.89219$	$\tau^* = -1.943$ (do not rej. H_0)

10.4.2 Johansen Cointegration Test

The Johansen cointegration test is as follows:

$$v_t = Av_{t-1} + \varepsilon_t$$
$$\Delta v_t = \Pi v_{t-1} + \varepsilon_t$$

where $\Pi = A - I$, n is the number of variables, v_t and ε_t are vectors $n \times 1$, and A and I are matrices $n \times n$. The rank (r), that is, the number of linearly independent vectors of the matrix Π determines the number of cointegration vectors. If, for instance, $r = 0$, then $\Delta v_t = \varepsilon_t$, that is, each variable constituting vector v_t is said to be a unit root process and, hence, presents no possible linear combination amongst themselves. If, conversely, Π is a full-rank matrix, then the long-term solution of the system above is given by n linearly independent equations, that is, the long-term system $\Pi v_t = 0$ has only one non-trivial solution; if the variables constituting v_t tend towards a fixed long-term value, then it means these variables are stationary by definition and, consequently, there is no cointegration. Therefore, in a system constituted by n variables, in order to obtain cointegration, the condition $0 < r < n$ must be fulfilled. It means the maximum number of possible cointegration vectors in this system is $n - 1$. The matrix Π also can be defined as $\Pi = \alpha\beta'$, where α and β are matrices $n \times r$ and $r \times n$, respectively. β stands for the normalised cointegration coefficient matrix and α the velocity adjustment parameters matrix. In order to know the very number of cointegration vector according to the Johansen procedure, it is to be employed in two different test statistics, namely the trace statistics and the maximum eigenvalue statistics. Both test statistics can be used, so we can identify the number of cointegration vectors, albeit their results might diverge from each other. As a swift description, we may say the trace statistics tests the null hypothesis that the cointegration rank, that is, number of cointegration vectors is equal to r, in opposition to the alternative hypothesis that there are more than r cointegration vectors. The maximum eigenvalue statistics, on the other hand, tests the null hypothesis that the cointegration rank is r against the alternative that there are $r + 1$ cointegration vectors.

Returning to our work here, after identifying the existence of a unit root in both series under discussion, let us move on to the next step which is determining the lag order to be used in the cointegration analysis. According to the lag order selection criteria shown in Table 10.3 below, all the criteria, except LR, indicate one lag as the optimal model if it is a Vector Autoregressive model (VAR) and no lag if it is a Vector Error Correction model.

Hence, our next step is determining the best specification for the model. Cointegration equations might have intercept and/or deterministic trends. More precisely, we have five different specifications for the cointegrating equation:

1. No intercept or trend in the cointegrating equation or test VAR

$$\Pi v_{t-1} = \alpha\beta' v_{t-1}$$

2. Intercept (ρ_0) and no trend in cointegrating equation—no intercept and no trend in VAR

$$\Pi v_{t-1} = \alpha\left(\beta' v_{t-1} + \rho_0\right)$$

Table 10.3 VAR lag order selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	−12.93088	NA	0.004425	0.255229	0.302445	0.274398
1	301.1296	612.0154	2.21e-05[a]	−5.044951[a]	−4.903301[a]	−4.987443[a]
2	304.7375	6.907253	2.22e-05	−5.038247	−4.802164	−4.942400
3	305.0530	0.593301	2.37e-05	−4.975265	−4.644748	−4.841079
4	305.2823	0.423369	2.53e-05	−4.910809	−4.485859	−4.738284
5	310.4625	9.386349	2.48e-05	−4.930983	−4.411600	−4.720120
6	312.7022	3.981748	2.56e-05	−4.900893	−4.287077	−4.651691
7	315.8710	5.524962	2.59e-05	−4.886683	−4.178433	−4.599143
8	321.6472	9.873940[a]	2.52e-05	−4.917047	−4.114364	−4.591167

[a]Indicates the lag order selected by the criteria

LR Sequential modified LR test statistic (each test at 5% level), *FPE* Final prediction error, *AIC* Akaike information criterion, *SC* Schwarz information criterion, *HQ* Hannan-Quinn information criterion

3. Intercept in cointegrating equation—intercept (γ_0) and no trend in test VAR

$$\Pi v_{t-1} = \alpha\left(\beta' v_{t-1} + \rho_0\right) + \alpha_\perp \gamma_0$$

4. Intercept and trend in cointegrating equation—intercept and no trend in VAR

$$\Pi v_{t-1} = \alpha\left(\beta' v_{t-1} + \rho_0 + \rho_1 t\right) + \alpha_\perp \gamma_0$$

5. Intercept and trend in cointegrating equation or test VAR

$$\Pi v_{t-1} = \alpha\left(\beta' v_{t-1} + \rho_0 + \rho_1 t\right) + \alpha_\perp\left(\gamma_0 + \gamma_1 t\right)$$

where $\alpha_\perp$ is a deterministic term outside the cointegration relation.

Performing the trace and the maximum eigenvalue tests for all five specifications above yields the following Table 10.4.

As we can see, the trace and the maximum eigenvalue tests showed different results from each other, which means the cointegration relation between the variables under discussion is inconclusive. According to the models 1, 4, and 5, there is no cointegration, for the rank of the coefficient matrix is either zero or full. Only models 2 and 3 provide us a possibility of cointegration, albeit their specification is different from one another. As a quick evaluation regarding these tests, we may quote the work by Lütkepohl et al. (2001) wherein the authors compare both tests by the use of simulations and conclude that for small samples of approximately 100 observations, the trace test, on the one hand, presents more distortions in its statistics than the eigenvalue one. On the other hand, the power of the

Table 10.4 Selecting the model

Trend	None	None	Linear	Linear	Quadratic
Models	Model 1	Model 2	Model 3	Model 4	Model 5
Trace	0	1	0	0	2
Max-eigenvalue	0	0	1	0	0

trace test, that is, its probability of rejecting the null hypothesis when the null hypothesis is false indeed, is higher than the power of the eigenvalue test. All in all, in spite of being rather small differences, the authors recommend to pick the trace test. Following their recommendation and assuming the existence of cointegration, we should then pick model 2 with no trend. Nonetheless, from Fig. 10.1, we might assert that both variables present as a trend as an intercept, in which case the most suitable model would be model 3. Therefore, regarding the period under discussion, we might say the existence of a stable long-term relationship between GDP and exports, according to the Johansen test, showed itself rather inconclusive, to say the least.

10.4.3 Engle-Granger Test

As discussed in the previous subsection, Johansen cointegration test is based on the maximum-likelihood estimation technique and, therefore, requires sufficiently large samples due to its low speed of convergence. Since our sample here has only 125 observations, which is considered rather small, we shall test any possible existence of cointegration between GDP and exports by the use of the Engle-Granger test. Once this test is based on the OLS estimation method, it might be more appropriate for small samples, for the estimated parameters converge more quickly towards the population parameters. Thus, we must now evaluate the results produced by the Engle-Granger cointegration method.

Firstly, given that GDP and exports data series are both unit root processes, we must estimate the long-term relation using the OLS method

$$lnY_t = \beta_0 + \beta_1 lnX_t + e_t$$

Now, we shall analyse the residual series e_t. Since lnY_t and lnX_t are both integrated of order 1, if e_t is stationary, then the GDP and exports series are cointegrated. In other words, we must test the residuals for a unit root. Thus, let us estimate an autoregressive process for the residuals with no trend, no intercept and 0 lags

$$\Delta e_t = a_1 e_{t-1} + u_t$$

Table 10.5 Engle-Granger cointegrating equation

Variables	Coefficients	Standard error	t-Statistic	*p*-value
Constant	7.145906	0.206704	34.57067	0.0000
lnX	0.660424	0.022786	28.98358	0.0000
R^2	0.872281	Mean dependent var		13.12763
Adjusted R^2	0.871242	S.D. dependent var		0.358919
S.E. of regression	0.128790	Akaike info criterion		−1.245392
Sum squared resid	2.040193	Schwarz criterion		−1.200139
Log likelihood	79.83701	F-statistic		840.0480
Durbin-Watson stat	0.401889	Prob(F-statistic)		0.000000

First of all, we must check if there is any serial dependence within error u_t. The Breusch-Godfrey autocorrelation test yielded a *p*-value of 0.38, which means the null hypothesis of no serial correlation was not rejected. Now, we must evaluate if the parameter a_1 is statistically significant. The null hypothesis is $a_1 = 0$, that is, the residual series has a unit root and, therefore, GDP and exports are not cointegrated. In order to test the null hypothesis, we must not use the standard critical values for the Dickey-Fuller unit root test, for the residuals e_t is generated from a regression which minimises the sum of squares of residuals between real and estimated values of the dependent variable and, consequently, the residual variance is already the smallest possible one implying in a biased test statistics. Table 10.5 of critical values for the Engle-Granger cointegration test takes this problem into account. The test statistics for a_1 is −3.699. The critical value obtained from a sample of 100 observations at the 5% significance level is −3.398. That is, once the test is left-tailed, we reject the null hypothesis which means the variables are cointegrated. Nonetheless, we cannot let the proximity between both the test statistics and the critical value go unnoticed. Such a result might indicate a weak long-term relation between GDP and exports during the period considered in this work. We can see below the coefficients estimated by the OLS method.

According to the Engle-Granger method, the Cointegrating equation is

$$lnY_t = 0.66 lnX_t$$

Therefore, the income elasticity of demand for imports is 1.51. We can see in Fig. 10.2 a comparison between both the actual and Thirlwall's Law annual growth rates.

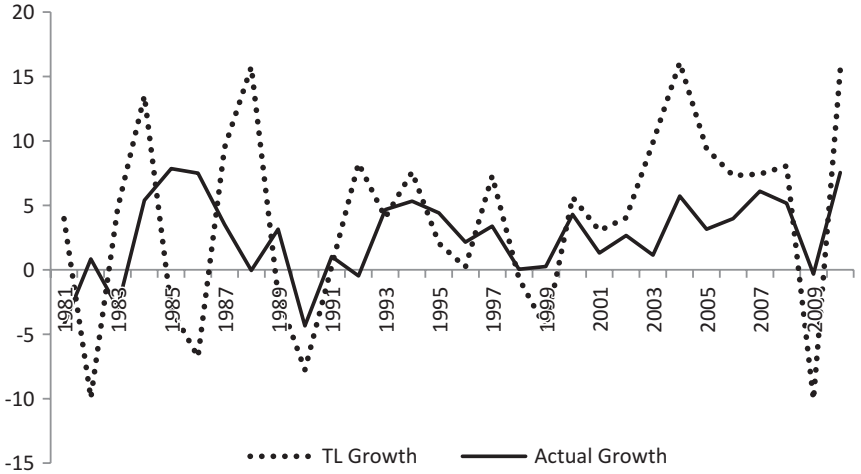

Fig. 10.2 The actual growth rate and the Thirlwal's Law growth rate per annum (in %)

As one can notice, the differences between the actual growth rate series and the balance-of-payments constrained growth rate series are quite meaningful and indicate a week cointegration relation. According to the theory, differences between the actual and the predicted series are explained by changes in real exchange rate and/or financial account. This result suggests that exchange rate dynamics and foreign capital flow played a very important role in Brazilian growth determination since 1980.

As we can see in Fig. 10.2, from 1980 until the mid-1990s the actual growth series and Thirlwall's Law growth series are way out of whack. Holland et al. (1998) argue that such a mismatch between both series during the 1980s is basically due to currency depreciations, once the capital inflow had utterly stopped throughout this decade. The authors also claim that during the 1990s, due to the financial liberalisation, the actual Brazilian growth became chiefly driven by the increasing capital inflow until the 1999 balance-of-payments crisis.

From the year 2000 until the 2008 crisis, according to Fig. 10.2, the actual growth rate series remained consistently below Thirlwall's Law growth rate series. The astonishing Chinese growth since the early 2000s boosted Brazilian exports of commodities, thereby shifting upwards Thirlwall's Law growth rates during this period. Figure 10.2 clearly shows

the Brazilian growth during the 2000s, apart from a brief period of recession in 2008–2009, is not balance-of-payments constrained. According to the BPC growth model, before reaching the potential growth rate determined by supply conditions, countries have to deal with foreign exchange shortage, thereby restricting their growth. In other words, balance-of-payments constraints are usually the main obstacle to a continuous growth. Nevertheless, a possible explanation for what seems to be happening in the Brazilian case during the last decade is that the country might have reached its potential growth rate first. The potential output growth rate (y_p) is given by the growth rate of the labour productivity (r) plus the growth rate of the number of employed persons (l), that is, $y_p = r + l$. According to the Penn World in Table 7.1, labour productivity (r) in Brazil grew at an average rate of 1.3% per annum from 2002 to 2010, whereas in China, for instance, it grew by 9.2% in the same period.[5] As for the growth of the unemployment rate (v), by definition, we have $v = n - l$, where n is the growth rate of the total labour force. If we assume that the total labour force can be proxied by the growth rate of the population, according to the IMF database, the average growth rates per year of the unemployment rate and the total labour force in Brazil from 2002 to 2010 are −5.1% and 1.2%, respectively, thus implying that the growth rate of the number of employed persons is equal to $l = n - v = 1.2\% + 5.2\% = 6.4\%$. Therefore, the average potential output growth rate of the Brazilian economy from 2002 to 2010 is approximately $y_p = r + l = 1.3\% + 6.4\% = 7.7\%$. In spite of the ups and downs, it can be seen in Fig. 10.2 that the actual growth rate of the Brazilian economy during this period converges towards the potential output growth rate. In 2010, the actual growth rate reaches the figure of 7.53%, which is quite close to the upper bound given by the potential output growth rate, that is, $y_p = 7.7\%$. Such figures seem to indicate that Brazil has been facing severe supply constraints preventing the country to pursue higher growth rates over time. As the data show the supply constraint is imposed by the slow growth rate of the labour productivity over this period. Low levels of innovation, learning, and technological dynamism are often cited as one of the main explanations behind the slow growth of the labour productivity. The negative impact over the industrial sector caused by the commodities boom and, consequently, the overvaluation of the domestic currency—this is widely known as the Dutch disease—is also pointed out by many as one possible

Table 10.6 VAR lag order selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	291.3982	NA	2.33e-05	−4.989625	−4.942149[a]	−4.970352[a]
1	297.0692	11.04850	2.27e-05[a]	−5.018434[a]	−4.876007	−4.960616
2	297.9236	1.635270	2.39e-05	−4.964200	−4.726822	−4.867838
3	298.6209	1.310429	2.54e-05	−4.907257	−4.574927	−4.772350
4	304.8796	11.54618[a]	2.44e-05	−4.946200	−4.518919	−4.772748
5	306.9873	3.815676	2.52e-05	−4.913574	−4.391341	−4.701577
6	309.3804	4.249856	2.59e-05	−4.885869	−4.268685	−4.635328
7	313.4790	7.137251	2.59e-05	−4.887570	−4.175434	−4.598483
8	317.5240	6.904259	2.59e-05	−4.888344	−4.081257	−4.560713

[a]Indicates the order of the lag selected by each criteria

explanation for the poor performance of the labour productivity in the Brazilian economy over this period. However, such an analysis on the causes of the low Brazilian potential growth is way beyond the scope of this work. We are just trying to demonstrate the importance of allowing the 2000s decade as a whole into the database, once this period is substantially different of the previous decades. This chapter, hence, seeks only to ply the current debate on growth and patterns of development for the Brazilian economy with some empirical evidence.

Next, we estimate the error correction model. First, we need to redetermine the lag structure of the model after taking the first difference of the variables, as in Table 10.6. As we can see, with the exception of the LR criterion that chooses four lags, we have two criteria (final prediction error—FPE and Akaike information criterion—AIC) choosing one lag and two criteria (SC and HQ) suggesting no lags. Given that the analysis of the error correction model estimated by the Engle-Granger method follows a procedure similar to a VAR, we then choose one lag to make it possible to estimate the model.

Estimating a VAR of order 1 and considering the lagged residue as an exogenous variable, we have the results of Table 10.7.

Now, the parameters measuring the speed of adjustment are 9% in each period for GDP and 12% in each period for exports, both of which are significant.

We perform the autocorrelation tests again. "As we can see, the Portmanteau test in Table 10.8 does not reject the null hypothesis of non-autocorrelation of errors. The LM test in Table 10.9, on the other hand, presents autocorrelation problem in the lags 6 and 10 at 5% of significance.

Table 10.7 Error correction model

	$\Delta \ln Y_t$	$\Delta \ln X_t$
$\Delta \ln Y_{t-1}$	−0.172797	−0.069640
	(0.08734)	(0.13146)
	[−1.97834]	[−0.52974]
$\Delta \ln X_{t-1}$	0.090587	0.017564
	(0.06222)	(0.09365)
	[1.45581]	[0.18754]
Constant	0.009495	0.014005
	(0.00501)	(0.00755)
	[1.89398]	[1.85617]
Residual_{t-1}	−0.095270	0.122813
	(0.03999)	(0.06018)
	[−2.38263]	[2.04068]
Adj. R^2	0.105068	0.010706
Sum sq. resids	0.346887	0.785817
F-statistic	5.774415	1.440095
Log likelihood		322.9350
Akaike information criterion		−5.120894
Schwarz criterion		−4.937988

Table 10.8 Portmanteau test

Lags	Q-Stat	Prob.	Q-Stat Aj.	Prob.	df
1	0.006274	NA	0.006325	NA	NA
2	0.991378	0.9111	1.007712	0.9086	4
3	1.257966	0.9960	1.280965	0.9958	8
4	7.181172	0.8454	7.403270	0.8299	12
5	12.73774	0.6918	13.19529	0.6584	16
6	22.45092	0.3166	23.40658	0.2693	20
7	28.52606	0.2385	29.84833	0.1898	24
8	34.43895	0.1868	36.17255	0.1383	28
9	34.75489	0.3380	36.51342	0.2669	32
10	43.96683	0.1699	46.54058	0.1122	36
11	44.76299	0.2787	47.41493	0.1959	40
12	46.65032	0.3640	49.50630	0.2629	44

The next step is to estimate the impulse-response functions following the error correction model. As illustrated in Fig. 10.3, we see that the impact of a disruption on exports generates a greater effect on the growth of the product in relation to the opposite causality, that is, the impact of GDP on exports. This result once again confirms the relationship between exports and GDP as predicted in theory.

Table 10.9 LM test

Lags	LM-Stat	Prob
1	0.602767	0.9628
2	0.976496	0.9133
3	0.303128	0.9896
4	6.463853	0.1671
5	6.006778	0.1986
6	10.42748	0.0338
7	6.489862	0.1654
8	6.095109	0.1922
9	0.352892	0.9861
10	9.823211	0.0435
11	0.870923	0.9287
12	2.033398	0.7296

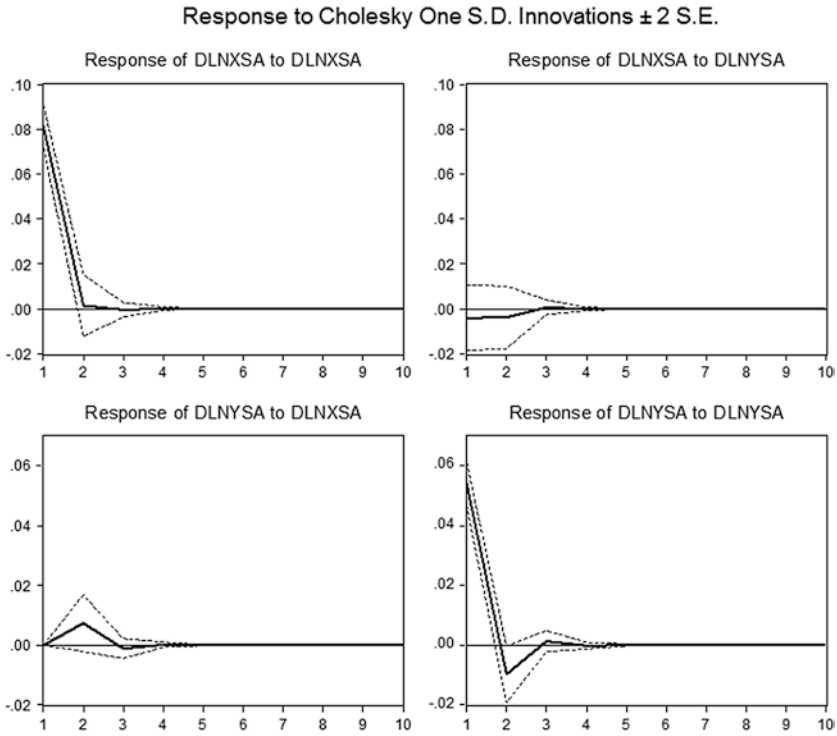

Fig. 10.3 Impulse response function

10.5 Summary

This chapter sought to test Thirlwall's Law for the Brazilian case in order to evaluate how well the exports dynamics accounted for growth from 1980 to 2010. Firstly, we showed some problems concerning the Johansen cointegration technique for small samples. Once the Johansen test is based on the maximum-likelihood estimation method, sufficiently large samples are required so that the estimated parameter can converge to the population parameter. Provided that the trace and the maximum eigenvalue statistics presented different specifications for the cointegrating equation, we concluded that the Johansen test should not be used to estimate any possible cointegration relation between GDP and exports regarding the Brazilian case for the period here considered. Secondly, we analysed such a long-term relation by the use of the Engle-Granger cointegration technique, once this test is based on the OLS method, and therefore is more appropriate than the Johansen technique for small samples. The Engle-Granger test did not reject the cointegration hypothesis, even though the statistical significance was rather weak. Lastly, based on our estimates, we analysed the Brazilian growth pattern over this period. Special focus is given to the analysis covering the 2002–2010 period, since the 2000s have not been fully explored by this literature yet. Our main conclusion is that, in spite of the commodities boom that propelled the Brazilian exports during the decade of the 2000s, the slow growth of the labour productivity due to the lack of technological innovations and structural changes imposed severe supply constraints that prevented the Brazilian economy to grow faster.

Notes

1. X in rate of change is equal to $dlnX/dt$.
2. This is the so-called Marshall-Lerner condition for a successful devaluation.
3. Enders (2010).
4. (1) Consistency: the estimated parameter converges in probability towards the true parameter value; (2) asymptotic normality: the estimated parameter

probability distribution converges to a Gaussian normal distribution; and (3) efficiency: the estimated parameter has the lower mean squared error among all asymptotically unbiased estimators.

5. Purchasing Power Parity (PPP) Converted GDP Laspeyres per worker at 2005 constant prices.

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11

Why Does Brazil Have a Small Participation in the Global Value Chains? An Analysis of the External Insertion of the Brazilian Economy

Marcos Reis and Daniel Sampaio

11.1 Introduction

About 60% of total global trade, which currently amounts to more than US$ 20 trillion, consists of intermediate goods and services that are incorporated at the various stages of the production process for final consumption[1] (UNCTAD 2013). This fragmentation of the production process can occur in the regional or even the global level, and it has led to the emergence of borderless production systems (Feenstra 1998). These processes, which can be formed by sequential chains or complex networks, are referred to as Global Value Chains (GVCs).

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The framework of GVC has evolved from its academic origins to become a major paradigm used by a wide range of international organizations, such as the World Bank (WB), the World Trade Organization (WTO), and the International Labor Organization (ILO). Using core concepts like "governance" and "upgrading", GVCs highlight the ways in which new patterns of international trade, production, and employment shape prospects for development and competitiveness (Gereffi 2014). In other words, it changes the regional and productive linkages around the world. In previous decades, especially during the 1960s and 1970s, developing countries used to have only one strategy for their industrial policy: the import-substituting industrialization (ISI). It consisted of creating large, vertically integrated corporations with all its operations located in the same place as a strategy for catching up with developed countries (Arend and Fonseca 2012).

Well established in almost all developing regions, including Latin America, ISI was a state-led effort to build domestic industries by requiring foreign manufacturers to replace imports with locally made products, beginning with the assembly of final goods and working back to key components, in return for guaranteed market access (Gereffi 2014). The aim of these policies was to create national industries (and attract multinationals) in key sectors that could contribute to diminishing—or even eliminating—the dependency on imports from rich and industrialized nations. Even though success during its initial stages is not clear,[2] the model started to lose momentum in the 1980s and, in the 1990s, it was practically abandoned by all countries. GVCs appear as the "new solution" for development. Emerging countries should abandon protectionism and instead of controlling all the phases of production, they should specialize in some of them and become integrated into international supply chains.

In this new paradigm, policies formerly used to foster industrialization, such as national content, currency devaluation,[3] and tariffs on imports, become meaningless. Companies should aim for increasing productivity and seeking insertion in GVCs. In fact, according to data from United Nations Conference on Trade and Development—UNCTAD (2013), firm-level evidence shows that participation in GVCs is linked to firm productivity. Compared with non-exporters (or non-importers),

firms that engage in international activities show significantly higher productivity levels. Additionally, in the GVCs' environment, domestic companies have access to world-class inputs of goods and services that can help them improve productivity and competitiveness (OECD 2013). Hence, protectionism and vertical policies should be eliminated, and countries should aim for insertion in GVCs to achieve higher and sustainable growth.

However, if insertion in GVCs seems to be the only exit for small and poor countries, the idea faces some resistance when extended to large developing economies that already count with some degree of industrialization (Veiga and Rios 2014). Countries with large internal markets have enough leverage power to push for the implementation of industrial policies that would be impossible for smaller states (e.g., local content regulations and tax breaks) (Gereffi 2014). For those countries, insertion in GVCs is not a panacea and presents negative facets that are not desirable, such as increased dependency on transnational companies (TNCs) and their strategies—with headquarters located in developed countries—and specialization in the lower levels of the GVCs, since the noblest ones are already occupied by firms from developed markets (Veiga and Rios 2014).

In this scenario, it is necessary to debate which external insertion strategy is the best for Brazil. Should the country pursue past policies and seek to develop entirely independent domestic industries that are separated from GVCs? Should it strive for more integration in GVCs even if this integration follows the current pattern and is based on low-value-added businesses? Alternatively, what is necessary for the country to capture, or create new, higher-value-added functions in new and existing GVCs? To answer these questions, we discuss the external insertion of Brazil in a historical perspective, to shed some light on the possibilities and boundaries of the particular Brazilian case and its participation in GVCs.

The conclusion discusses about Brazil as having negligible participation in GVCs and that this can be explained by its (lack of) external insertion strategy. Nowadays, it should seek more integration with other countries in the region, coordinating regional supply chains to compete

in a global market that is dominated by GVCs. The chapter's aim is to discuss the relationship between the external insertion of the Brazilian economy and its participation in GVCs. For that, the chapter is structured as follows. After this introduction, the second section discusses the external insertion of the Brazilian economy in a historical perspective. The third segment presents GVCs, its main definitions, and aspects and explains Brazil's participation in them, while Sect. 11.4 analyzes what prevents Brazil from participating more actively in GVCs, the available options of economic policy to enhance the country's involvement and their desirability. Finally, Sect. 11.5 presents the concluding remarks.

11.2 The External Insertion of the Brazilian Economy in Historical Perspective

The "discovery" of Brazil in 1500 is nothing more than a particular chapter in the history of European mercantilism. As a colony of exploitation, the country was forcibly inserted into unequal international trade relations that spanned many economic cycles, such as sugarcane, gold, rubber, and coffee (Furtado 2007). Brazil has maintained international economic relations since its entry into the global trade arena at the time of mercantilism. Therefore, the main topic of this chapter is not necessarily about the low participation of the country in international trade, particularly in GVCs, but the dynamics of its insertion.

An example of how Brazil participated in the global trade and production integration can be observed in the rubber cycle during the last quarter of the nineteenth century. The rubber boom occurred with the cultivation of rubber inside the Amazon rainforest. This cycle lasted, approximately, from 1870 to 1910, and it was aimed at supplying the thriving US auto industry. The decline was marked by the domestication and rationalization of rubber cultivation in Asia, which enabled increased productivity and reduced costs, and subsequently by the replacement of natural rubber for a synthetic substitute (Furtado 2007; Cano 2007).

In the 1950s, the historical persistence of the argument that the process of international insertion of the Latin American countries was based on the abundance of natural resources, and their limited industrialization drew the attention of some researchers from the Economic Commission

for Latin America and the Caribbean (ECLAC) to a particular interpretation of international economic relations under the center-periphery system (Prebisch 2000; Furtado 2009). In short, this perspective argues that there is an international division of labor established between economies that produce manufactured goods and others that supply primary products. The theory says that, in the long term, there is a downward trend for the price of commodities. In turn, this would benefit countries with higher levels of industrial development, given that their manufactured products have greater income elasticity (Bielschowsky 1995).

The process of capital accumulation that resulted from the activities of producing, circulating, and distributing coffee in the state of São Paulo between the periods of 1870 and 1920 created the conditions that led to the end of the agro-export model after the crisis of 1929. Among these conditions that led to this dynamic of productive diversification were the use of cheap labor (mostly immigrants who arrived during WWII), a mercantilist agricultural production, and the development of a rail system. In addition, the urbanization led to the creation of a complex bank network activity that enabled the capital from the coffee complex in São Paulo to expand to other areas of the economy (Cano 2002; Mello 2009).

The first phase of Brazil's industrialization process occurred between 1930 and 1955 (Draibe 2004). Basic industrial sectors were developed during this stage, such as food, beverage, and textiles. Given the limited ability to integrate industries that required larger scales to operate, as well as Brazil's dependence on imported inputs and capital goods, this period became known as "restricted industrialization".

The Brazilian industrialization represented a "change in the dynamic center" (Furtado 2007) because it modified the unwritten rules of development relationships. Before the industrialization, business cycles were generally determined exogenously, mainly by price levels (terms of trade), and the Brazilian regions were mostly isolated from each other in economic terms, forming true "regional archipelagos", that is, more focused on the external market (Cano 2007). After the initial breakdown of the export-oriented model, the country started to increase its auto-sufficiency reproduction of capital (Tavares 1998).

In 1956, the period known as the "heavy industrialization phase" began. It was marked by a stronger State participation through industrial policies[4] and the incorporation of more sophisticated intermediate industrial sectors,

such as metallurgy. During this phase, the automotive industry stood out and attracted multinational companies. The construction of the new federal capital, Brasilia, and the creation of a wide road infrastructure were also symbols of this plan to renovate the national industrial park and to promote national integration. In the context of the "Cold War" and reconstruction policies, especially the European Marshall Plan, the Brazilian State had more freedom to conduct its industrial policy, attract large foreign companies, and seek external funding (Lessa 1983; Draibe 2004).

In this crucial stage occurred the formation of production chains in several sectors of the economy, following the established worldwide pattern of organization at the time: the "multi-domestic" standard (Porter 2004). Under this standard, international competition reflected the domestic competition, that is, each country hosted the largest possible share of production chain links. Besides, the existence of a technological standard that was based on sectors of the Second Industrial Revolution enabled a greater approximation of the national productive structure to the foreign one (Carneiro 2002).

Notwithstanding the very volatile cycles of growth, the existence of structural problems, the limited public spending capacity, the external constraints, and the latent inflation, the country continued its industrialization path. It did not falter even with the change from a democratic government to a military dictatorship, which lasted from 1964 to 1985, mainly justified by the high rates of economic growth as a legitimization of power.

The last major effort of incorporating modern sectors into the national economy happened during the authoritarian government with the Second National Development Plan (II Plano Nacional de Desenvolvimento), during the period 1974–1979 (Lessa 1998). The plan was a structural adjustment policy in the context of the international crisis of the early 1970s (Carneiro 2002). The goal was to sought complementation for the sectors of durable consumer goods and capital goods in Brazil, with the latter needing a larger scale to operate properly. In addition, oil production was encouraged with fiscal incentives—oil was among the most imported items at the time—and hydroelectric power plants were constructed to lower the energy sector's external dependency (Lessa 1998).

The result was the creation of a productive structure built along the lines of the Second Industrial Revolution, strongly based on the development of sectors such as automobiles, aircraft, chemical, mechanical, and

so on, to improve the performance of manufactured exports but without incorporating the endogenous nucleus of technological innovation. The industrial sector developed following the standard template of a typical "Chandlerian" company, that is, one that has the characteristic of being multinational, multidivisional, and multifunctional (Chandler Jr 2009). Supply chains were locally integrated with the reduction of imported goods dependency, particularly oil and capital goods.

The financing option adopted for that industrial policy was mainly constituted of external loans in US dollars. Plenty of factors exacerbated the country's external vulnerability and led to the external debt crisis that erupted in 1982. The main ones were: (1) the enormous volatility in oil prices that occurred in the 1970s, (2) the spike of US interest rates in the beginning of the 1980s, (3) the reduction of commodity prices after 1980, and (4) the composition of Brazil's foreign debt (short term and high interest). If, on the one hand, public debt management in Latin American countries created external bottlenecks in several countries of the region. On the other hand, Asian countries had fewer problems, not only because of their better management of foreign debt but also due to their lower levels of leverage (Baer 1993; Carneiro 2002).

The external debt crisis of the 1980s ended the development model based on industrialization through import substitution, in which the State was the main coordinator between the private and the national capital (private and public). There was a downturn in expectations in relation to investments, followed by economic depression, and a great effort to honor commitments made in US dollars. The inflow of external capital only effectively returned to the country in 1994, when the Real Plan brought back monetary stabilization.

Democracy returned in 1985. Initially, by indirect elections and then, with the introduction of the 1988 Constitution, known for its civil rights orientation. The 1980s, however, were a time in which the developed economies were also going through profound changes, including the fall of the Berlin Wall. The reduction in freight prices and the technological advancement of the Third Industrial Revolution—for example, semiconductors, fine chemicals, and telecommunications—allowed for a global change in the pattern of industrial accumulation and organization, now in the form of GVCs.

During the 1990s, Brazil experienced a commercial and financial liberalization that was both faster and more intense than the one that occurred in Mexico—which is considered one of the most economically liberal countries in Latin America (Tavares 1999). The reforms advocated by the Washington Consensus, notably the rapid and unplanned trade liberalization process, coupled with a growing inflation rate, were factors that decreased expectations and resulted in both low investment rates and economic growth. Since the 1980s, industry alone could no longer sustain national growth. Industrial production was also reduced at the expense of international competition, with a series of defensive adjustments that were adopted by the local business community (Coutinho and Ferraz 1994).

The restructuring process continued with the following characteristics: (1) loss of dynamism in investment and industrial production, (2) end of the State as the coordinator agent of economic development, and (3) change in the ownership structure toward a denationalization of the supply chains. The process of internationalization of the Brazilian industry was given mostly by Foreign Direct Investment (FDI) aimed for the domestic market. Only after 2003, a larger movement of Brazilian companies was observed toward the external market in a national and international favorable environment.

From 2004 to 2010, driven primarily by the pace of the Chinese growth, the country resumed its growth trajectory by improving its terms of trade in international markets. In addition, the internal market went through a major expansion due to public policies that aimed at improving general living condition of the lower classes, for example, raising the minimum wage, expanding social security, and "Bolsa Família"—a successful income and wealth redistribution program.

In this context, there was a partial recovery of government policies and higher public investment capacity, including the deliberate Brazilian Development Bank (BNDES) lending policy for the establishment of "national champions", and there was an overall improvement in business expectations that resulted in increased investment, at least until the outbreak of the international crisis of 2008. When the financial crisis erupted in 2008, the Brazilian government used countercyclical policies to mitigate the effects in the country, maintaining low levels of unemployment and a high consumption rate. The latter was particularly encouraged by direct incentives for the purchase of automobiles, real

estate, and appliances. However, the continuity of the international crisis and the reduction in Chinese growth pace made the country undergo a new round of reduction in GDP growth and accelerating inflation.[5] These facts point out to the limits of the development model adopted.

This framework has resulted in a loss of dynamism of the Brazilian industrial sector, now characterized by a greater participation of foreign capital and fewer value-added activities. Furthermore, a reversal of the external insertion structure is also noticeable, now increasingly based on natural resources. Notably, by the means of a "noncreative destruction" procedure, the restructuring process resulted in a dismantlement of the development model that was gestated in the period from 1930 to mid-1980, impacting the country's participation in GVCs:

> When low value-added activities tend to dominate in a specific country or region, the consequences for economic performance and social well-being can be profound and persistent. Specifically, the entrenchment in narrow and routine activities with little added value can keep industries, and national companies stuck in unprofitable and technologically shallow segments of the value chain. (Sturgeon et al. 2013, 16 and 17)

Brazil waited a whole century to go through its First Industrial Revolution, 90 years more to perform its Second Industrial Revolution, and it is already 35 years late in achieving the standards established by the Third Industrial Revolution. This goal appears to loom evermore distant with its international integration increasingly based on natural resources and an early beginning of what could be classified as a premature deindustrialization process (UNCTAD 2003).

11.3 The Global Value Chains and Brazil's Participation

Since the post-WWII years, world production is fragmenting into different countries around the world, always in pursuit of cost minimization. This process has accelerated in recent decades due to technological advances that have occurred, particularly in transportation and communication, as well as reforms in trade policies, which has led to a significant

transformation of international trade. This change is reflected in a vertical specialization of production, representing a new international division of labor that resulted in increasing trade of inputs among nations (Daudin et al. 2011).

The concept of GVC can be traced back to the end of the 1970s with works on the "commodity chain" (Bair 2005). The idea was to identify the sets of inputs and transformations that lead to an "ultimate consumable", describing the linked set of processes that culminate in the product (Hopkins and Wallerstein 1994). As De Backer and Miroudot (2013) point out, the concept of "global commodity chain" was later introduced in the work of Gereffi (2014), describing, for example, the apparel commodity chain, from the raw materials (such as cotton, wool, or synthetic fibers) to the final products.

In the 2000s, there was a shift in terminology from the "global commodity chain" to the "global value chain", the latter coming from the analysis of trade and industrial organization as a value-added chain in the international business literature (Porter 2004). This concept is more ambitious than the latter in the sense that it tries to capture the determinants of the organization of global industries (Bair 2005).

11.3.1 The Global Value Chains

A value chain describes the full range of activities through which a good or a service passes from its conception to its distribution and beyond. This includes several activities such as design, production, marketing, distribution, and support to the final consumer. All these activities can be contained within a single firm or divided among different enterprises (UNCTAD 2010). It can be contained within one place or spread over wider areas, forming a GVC. In a nutshell, the GVC is a chain of activities which are divided among multiple firms in different geographical locations. According to UNCTAD (2008), "GVCs cover a full range of interrelated production activities performed by businesses in various geographic areas to bring out a product or a service from conception to complete production and delivery to final consumers".

As Sturgeon and Memedovic (2011) point out, despite significant data gaps, recent research strongly suggests that GVCs have become a central

force, driving structural change in many modern economies. This brings positive and negative outcomes. Bernard et al. (2006) have shown that in the US, firms that trade tend to be larger, earn higher profits, spend more on R&D, and pay higher wages than firms that do not. In addition, foreign intermediate goods play a very important role in both industrialized countries and recent developing countries such as India and China in achieving higher productivity (Miroudot et al. 2009; Goldberg et al. 2008). Additionally, for developing countries, trade, investment, and knowledge flows that underpin GVCs can provide mechanisms for rapid learning, innovation, and industrial upgrading (Lall 2000; Humphrey and Schmitz 2002).

However, the GVCs also have a negative side. The globalization of value chains has several impacts on economic performance, affecting employment, productivity growth, prices, and wages, and these impacts may vary across activities, regions, and different social groups (OECD 2007). Obviously, some of these results can be harmful to the economy, representing barriers for future growth and development. For instance, Prochnik (2010) observes that the leading companies in the GVCs are always seeking to minimize their costs and aim to replace their suppliers with more cost-effective ones at any opportunity. This creates a "race to the bottom" at the lower stages of the GVC that can be harmful to developing countries that are not productive enough to enter into the top levels of the chain but cannot compete anymore in low-skilled activities at the bottom.

It is also important to observe distribution of gains across countries under GVCs. As Banga (2013) observes, the balance of power often favors nodes with high technology (firms that control patents and licenses are likely to extract maximum rents in GVCs). In addition, to extract maximum rents, governance becomes an important ingredient (Gereffi et al. 2005). It ensures that activities, actors, roles, and functions in the value chain are organized in a manner that rents are maximized.

Industrial and commercial firms have both promoted globalization, establishing two types of international economic networks. One is "producer-driven" and the other "buyer-driven". Companies of the first type are large, usually TNCs, and play the central role in coordinating production networks (including their backward and forward linkages). This is

typical of capital and technology-intensive industries such as automobiles, aircraft, computers, semiconductors, and heavy machinery. In opposition, buyer-driven value chains are those in which large retailers, marketers, and branded manufacturers play the pivotal roles in setting up decentralized production networks in a variety of exporting countries, typically located in developing countries (Gereffi and Memedovic 2003).

As Baldwin (2012) observes, the global supply chain is not very global—it is regional. Most of the large numbers, which indicate a strong supply chain relationship, are in the regional blocks. Hence, local value chain links are often more important than global ones, especially in North America, Europe, and East and South-East Asia. In the Transition Economies, Latin America and Africa, regional value chains are relatively less developed (UNCTAD 2013).

According to Estevadeordal et al. (2013), half of the value added in the global trade has its origins in countries in the same region. The numbers differ significantly among the regions; while Europe represents more than half of the total value added (51%) and is very high in Asia (47%) and North America (43%), in Latin America the situation is different, with only 27% of the value added produced within countries in the region. The authors identify the costs of transportation and trade policies as the most important factors for this big discrepancy among the regions.

Table 11.1 shows data related to the participation of some regions in GVCs and their share of foreign value added in exports. It is interesting to note that South America has a participation (38%) that is higher than South Asia (37%). However, the recent growth rate for the Asian region was higher, indicating that it might soon overcome South America. Regarding the share of foreign value added in exports, while European Union and East and South-East Asia have 39% and 30%, respectively, some developing regions such as South America (14%), Transition Economies (13%), and South Asia (11%) lag behind with significantly smaller results.

The experience over the last 20 years shows that, as countries increase their participation in GVCs, their GDP growth rates tend to rise as well. A statistical analysis correlating GVC participation and per capita GDP growth rates shows a significant and positive relationship, for both developed and developing economies (OECD, WTO, and UNCTAD 2013). Figure 11.1 shows the result of developing economies. While countries in

Table 11.1 Share of foreign value added in exports by region, GVC participation rate, and growth of GVC participation

Region	Share of foreign value added in exports (2010) (%)	GVC participation rates (2010) (%)	Growth of GVC participation (2005–2010) (%)
Global	28	57	4.5
Developed Economies	31	59	3.7
European Union	39	66	3.9
United states	11	45	4.0
Japan	18	51	1.9
Developing Economies	25	52	6.1
Africa	14	54	4.8
Asia	27	54	5.5
East and South-East Asia	30	56	5.1
South Asia	11	37	9.5
West Asia	16	48	6.4
LAC	21	40	4.9
Central America	31	43	4.1
Caribbean	21	45	5.7
South America	14	38	5.5
Transition Economies	13	52	8.0

Source: UNCTAD-Eora GVC Database

Note: GVC participation indicates the share of country's exports that is part of a multi-stage trade process

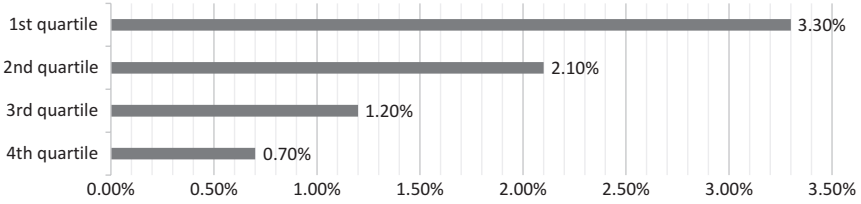

Fig. 11.1 GDP per capita growth rates by quartile of growth in GVC participation, developing economies only (1990–2010). (Source: UNCTAD-Eora GVC Database. UNCTAD analysis. Note: data for 120 countries ranked by GVC participation growth and grouped in quartiles (of 30 each); growth rates reported are median values for each quarter)

the first quartile in growth of GVC participation had a median growth of 3.3% per year during the period, those in the last quartile presented less than a fourth of it (0.7%). Obviously, these results only demonstrate a correlation between the two variables and do not necessarily show causality. More research is needed to identify causality.

A country's position in a global supply chain, in terms of stages of production, is correlated with its static comparative advantage. Commonly, developing countries—which have an abundant supply of unskilled and cheap labor—will handle low-value-added unskilled labor-intensive tasks. In opposition, developed countries capture most of the value added, handling skill and capital-intensive tasks. This indicates the necessity for developing countries to have an upgrade of the value chain ladder as an objective. According to Gereffi (2014), economic upgrading is defined as the process by which economic actors—firms and workers—move from low-value to relatively high-value activities in GVCs. It is the set of strategies used by countries, regions, and other economic stakeholders to maintain or improve their positions in the global economy. In that sense, their challenge can be summarized in the following way:

> The challenge of economic upgrading in GVCs is to identify the conditions under which developing and developed countries and firms can "climb the value chain" from basic assembly activities using low-cost and unskilled labor to more advanced forms of "full package" supply and integrated manufacturing. (Gereffi 2014)

Diverse mixes of government policies, institutions, corporate strategies, technologies, and worker skills are associated with upgrading success (Gereffi and Fernandez-Stark 2011). Humphrey and Schmitz (2002) identify four types of upgrading: (1) *process upgrading*, which transforms inputs into outputs more efficiently by reorganizing the production system or introducing superior technology; (2) *product upgrading* (more sophisticated product lines); (3) *functional upgrading*, which entails acquiring new functions to increase the overall skill content of the activities; and (4) *chain or inter-sectorial upgrading*, where firms move into new but often related industries.

11.3.2 The Presence of Brazil in Global Value Chains

Once presented the main characteristics of the GVCs, we move to the analysis of how Brazil is inserted on them. First, Table 11.2 shows the participation in GVCs in terms of share in total value added and the share in forward and backward linkage for selected countries. The backward links are associated with the export-related sourcing of foreign value-added while the forward links indicate the value added to foreign producers for each countries' exports. Commonly, the larger the size of the domestic market, the lower its backward engagement, and the higher the forward engagement. The intuition is that countries with a broader market can draw on a larger array of intermediates in terms of both purchases and sales. It is also expected that high per capita income leads to a higher forward engagement while the relationship with backward engagement is insignificant (OECD, WTO, and World Bank Group 2014).

Table 11.2 Participation in GVC in terms of share in total value added by GVCs and forward and backward links (2009)

Country	Participation in GVC in terms of share in total value added by GVCs (%)	Share in forward linkage (%) (a)	Share in backward linkage (%) (b)	Ratio of (a)/(b)
China	8.9	5.2	12.6	0.41
United States	8.8	12.6	5.0	2.53
Germany	8.7	8.0	9.3	0.86
Japan	4.5	6.1	2.8	2.23
France	4.0	3.7	4.4	0.85
Korea	3.9	3.0	4.9	0.60
United Kingdom	3.6	4.2	2.9	1.45
Italy	3.1	3.3	3.0	1.08
Russia	2.3	4.5	0.7	6.51
Vietnam	2.1	0.3	0.7	0.40
Mexico	1.5	0.8	2.1	0.38
Australia	1.3	1.8	0.7	2.50
South Africa	1.1	0.4	0.4	1.05
Brazil	**1.0**	**1.4**	**0.5**	**3.01**
Singapore	0.8	1.3	3.2	0.42
Indonesia	0.6	1.1	0.5	2.03

Source: OECD Stat and OECD-WTO TIVA, May 2013

It can be noted that Brazil's participation in GVCs as a percentage of the global total is small, less than Russia, Vietnam, Mexico, and South Africa (developing countries with smaller economies than Brazil). The forward integration, however, is higher than Vietnam, Mexico, and South Africa. In contrast, the backward engagement captures the demand side of value chains which is more closely linked to general characteristics of countries such as market size or degree of industrialization, is very low in Brazil, being only higher than South Africa.

The weak participation of Brazil in the GVCs can also be observed looking at the total foreign value added in gross exports. Table 11.3 shows the indicator for two different periods (1995 and 2008). Brazil figures again at the bottom of the list. In 2008, it was second to last in the sample and increased to only 1% of its value added in exports (from 10% to 11%) during the 13-year period of analysis. During the same period, other emerging regions such as China, Vietnam, and India presented a change of 21%, 16%, and 14%, respectively.

Table 11.3 Total foreign value added in gross exports (%) (1995–2008)

Country	1995 (a)	2008 (b)	Change (b−a)
Singapore	47	53	+6
South Korea	24	43	+19
Vietnam	24	40	+16
Malaysia	40	38	−2
Thailand	30	38	+8
China	12	33	+21
Mexico	27	31	+4
Germany	19	28	+9
France	18	27	+9
India	10	24	+14
Italy	22	23	+1
South Africa	12	21	+9
Japan	7	19	+12
United Kingdom	21	19	−2
Indonesia	15	17	+2
United States	8	15	+7
Australia	12	14	+2
Brazil	**10**	**11**	**+1**
Russia	11	7	−4

Source: OECD Stat and OECD-WTO TIVA, May 2013

It is necessary to point out that the heterogeneity among the nations should be taken into consideration in this type of analysis. Plenty of elements will have in an influence on the total foreign value added.[6] For example, natural resource-rich countries such as Australia, Russia, and Brazil tend to have higher (lower) domestic (foreign) value added in their exports. Also, large economies such as the United States, Brazil, and Japan can draw on larger domestic markets for their intermediates and engage in more technologically advanced activities[7] (OECD, WTO, and World Bank Group 2014). In that sense, Brazil—being a commodity exporter and a large economy—has a double "disadvantage" to participate in the GVCs.

Additionally, it should be noted that the location where the value is being added is not necessarily identical to where the generated income will eventually end up. The GVCs involve sizeable flows of investment and part of the value added in emerging regions will accrue as income to multinational firms headquartered in advanced regions through the ownership of capital (Timmer et al. 2014).

Table 11.4 presents the share of domestic value-added trade and the GVC participation for the top 25 exporting economies in 2010. Brazil appears second to last in terms of GVC participation rate and among the five economies in terms of the domestic value added in trade. It can be noted that most of the economies with very high GVC participation rate are wealthy countries.

How about a comparison with other emerging markets? Figure 11.2 shows the GVCs' participation rate of the top 25 developing economy exporters. The previous table showed that, on average, wealthy countries have a higher involvement in the GVCs than emerging nations. Since there are structural differences between these economies and also different policy options and development strategies, it is advisable to compare Brazil with its peers, without advanced economies. Nevertheless, its participation in GVCs is minuscule even when compared only to developing countries. Brazil occupies the 22nd position among the top 25 developing exporters, in a sample that excluded predominantly oil-exporting countries. The exclusion of major oil exporters is due to the reason that extractive industries themselves naturally rank much lower as they require low imported content of exports apart from some services (OECD, WTO, and UNCTAD 2013).

Table 11.4 GVC participation rate and domestic value-added trade share of the top 25 exporting economies (2010)

Country	GVC participation (%)	Domestic value added trade share (%)
Singapore	82	36
Belgium	79	42
Netherlands	76	47
United Kingdom	76	58
Hong Kong	72	46
Sweden	69	60
Malaysia	68	58
Germany	64	63
South Korea	63	56
France	63	69
China	59	70
Switzerland	59	71
Russian Federation	56	91
Saudi Arabia	56	86
Italy	53	73
Thailand	52	70
Japan	51	82
Taiwan	50	71
Spain	48	72
Canada	48	70
United States	45	89
Mexico	44	68
Australia	42	87
Brazil	**37**	**87**
India	36	90

Source: UNCTAD-Eora GVC Database

Note: GVC participation indicates the share of countr ies' exports that is part of a multi-stage trade process

Even more important than to observe their overall participation in the GVCs is to identify which sectors and different levels of technology sophistication the countries are inserted in the GVCs. Table 11.5 presents the numbers for selected emerging countries for 2010. Brazil has more than half of its participation in GVCs concentrated in resource-based and only 5% in sophisticated manufacturing. On the other hand, China, Costa Rica, Malaysia, and Singapore have more than 30% of their participation in sophisticated manufacturing. This indicates that Brazil seeks not only to improve its involvement in the GVCs but also to pursue policies to economic upgrading within the GVCs, as observed by Gereffi (2014).

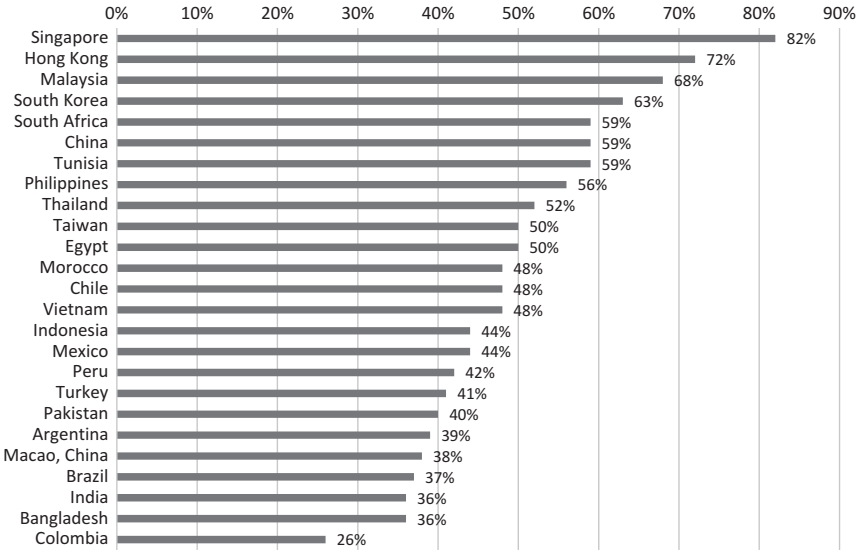

Fig. 11.2 GVC participation rate of the top 25 developing economy exporters. (Source: UNCTAD-Eora GVC Database. Note 1: Top 25 excludes predominantly oil-exporting countries. Note 2: GVC participation indicates the share of countries' exports that is part of a multi-stage trade process)

This section showed that Brazil has a small participation in the GVCs. This seems to be a common feature in the region, South America. It was also observed that Brazil has a tendency to participate less in GVCs than other economies because the country counts with two features that act as barriers to more integration: it is a large economy, and its exports are concentrated in resource-based products. However, being a big economy, Brazil has not only limitations but also face benefits. Large emerging economies have more options to upgrade within GVCs than small economies. As Gereffi (2014) observes, large emerging economies can focus on manufactured exports, but they can also reorient their productive capacity to serve domestic demand if export markets become less attractive. Hence, there is the possibility to combine policies that aim for higher participation in the GVCs with policies focused on the domestic market, which can serve as a stabilizer for the demand of the firms, especially in its initial stages of operating in new markets. The next section aims to analyze why Brazil has a small participation in the GVCs and discuss policy alternatives—and their desirability—to revert this scenario.

Table 11.5 Participation in GVCs at different levels of technological sophistication and value added (2010)

Country	Resource-based (%)	Low-tech manufacturing (%)	Mid-level manufacturing (%)	Sophisticated manufacturing (%)	Knowledge-based services (%)
Brazil	**60**	**5**	**15**	**5**	**10**
China	10	2	20	30	5
Costa Rica	20	5	5	35	15
India	35	15	10	5	25
Malaysia	30	10	15	30	5
Russia	75	5	10	0	5
Singapore	20	5	15	35	15
South Africa	55	5	25	0	5

Source: UNCTAD (2013)

Note: Product categories are based on Lall's classification of technological intensity. Knowledge-based service exports include insurance, financial services, computer and informational services, royalties and license fees, and other business services. See Lall (2000). Other non-knowledge-based services are excluded from calculations; hence, percentages do not sum up to 100. Resource-based products are the sum of commodities and natural resource-based manufactures

11.4 What Is Preventing Brazil from Participating More Actively in GVCs?

The Brazilian international insertion underwent a change after the 1990s toward natural resource-intensive and low-value-added sectors, such as soy, meat, iron ore, food, beverages, and footwear. The structural changes that resulted from the commercial and financial liberalization and from the State reorganization in the 1990s made the country more vulnerable to changes in the international markets, especially to the financial and commodity markets. Regarding commodities and their impact on the growth cycle, this process took a more robust form after the 2000s, when there was an improvement in terms of trade in favor of primary products. This occurred in the context of increasing trade relations with China, Brazil's prime trade partner since 2008.

The trade relationship between Brazil and China has some elements of a "center-periphery" one. Brazil imports technology-intensive products, such as electronics, machinery, and telecommunications equipment, and export commodities with a low degree of industrial processing. This is also a result of policies implemented in both countries. For instance, according to (Sturgeon et al. 2013, 9) "to put into practice the strategy of promoting its soybean processing industry, China imposed a 9% tariff on soybean oil imports, while the tariff on unprocessed soybean imports was only 3%".

Brazil is an important global supplier of commodities with a large internal market of approximately 200 million inhabitants. The domestic market has been recently strengthened in the last decade with increases in minimum wage, expansion of credit, and income redistribution programs, such as the "Bolsa Família". This increase in the purchasing power of the population, coupled with an overvalued currency, contributed to an upsurge in imported goods, particularly those with high value added.

The high interest rates in Brazil, among the highest in the world, attract speculative foreign capital. These high levels of interest assist in financing the Brazilian balance of payments, which has shown increasing current account deficits since 2008. The high levels of interest rates and their impact on other macroeconomic variables make a complicated environment for the State to

coordinate and to take a more active stance in industrial policymaking. The industrial sector development is no longer a priority in economic policy, which is currently more focused on monetary stability, thus limiting a more dynamic insertion in GVCs.

One element that contributes to Brazil's delay in modernizing its production structure is the growing participation of foreign companies in its economy. As Sect. 11.3 discussed, this puts the power of decisions, such as what, how, and where to produce, in the hands of their headquarters, which are usually located in central countries, leaving global companies with control over the various steps of production of value chains. In Brazil, FDI is more drawn toward its large domestic market than toward the opportunity for innovation and development of new products (Sarti and Laplane 2002).

Developed countries, now with dynamic industries, used protectionist trade policies, such as trade barriers, and active industrial policy to promote development in the past (Chang 2004). In some Asian countries,[8] for example, this process took place with the US support in a particular geopolitical context related to the Cold War. However, since the creation of the WTO in 1995, there is less room for protectionist policies—as other countries have done in the past—since their use can lead to the imposition of trade penalties, consequently diminishing the available options to promote economic policies (Cano 2000).

This "passive" external insertion, a process that was conditioned by the exit of the State as coordinator agent of economic development in the 1980s, contributed to the country's low insertion in prime stages of GVCs. There was the renouncement of a national development strategy, including the coordination among the public, domestic, and foreign private capital (Cano 2014). This was a crucial factor for the country to miss the moment of transformation of productive structures that began in the 1980s. In that sense, Brazil not only abandoned its industrialization strategy but also went through a model rupture, while the world was experiencing a process of profound changes in production organization (Porter 2004; Chesnais 1996).

After the rupture with the ISI model, especially since the 1990s, the State's role in promoting productive development has been ineffective. The restart of Brazil's industrial policy can be attributed to the launch, during Lula's government, of the program Policy for Trade and Industry

(PITCE) for the period of 2003–2006. The PITCE faced many difficulties, including the legacy inherited from the 1990s, when many government agencies for coordination and planning[9] that played a significant role throughout the process of industrialization were extinguished or reduced (Cano and Silva 2010).

The PITCE aimed at increasing diversification of exported goods and the participation of technology-intensive products. The diagnostic was that the country had to encourage innovation dynamics to add value and increase industrial competitiveness. However, results went the opposite way.

Between 2007 and 2010, a new industrial policy was designed. The Productive Development Policy (PDP) consisted of the broadest set of industrial policies since the second PND. It was intended to promote the integration of productive chains of a given set of industries in Brazil, furthering technological development and diversifying the country's exporting structure. However, the international crisis that began in 2008 prevented its success.

For the period of 2011–2014, a new plan was elaborated: *Brasil Maior*. It was aimed at increasing industrial competitiveness through strategic agendas. Nevertheless, since the productive structure was severely affected by the successive international crisis, this plan eventually served only to maintain employment levels and existing production chains, while little was done to advance the development of high-technology sectors.

An active institution in financing industrial policy since the beginning of Lula's government has been the BNDES. Inspired by the experience of industrialized countries such as South Korea, the bank sought the formation of large entrepreneurial groups, the so-called national champions. So far, such policies did not produce the expected results. The investment rate remains low; there was no diversification in the productive structure or exported goods, nor more insertion in GVCs. Given the high costs of such policy, which burdened the State through subsidized Treasury loans, many have questioned it about its cost-effectiveness, objectives, and timing.[10]

Complementary to the industrial policy, other programs were developed by the federal government aiming at promotion of productive activities. On the infrastructure area, the main one was the Growth Acceleration Program (PAC). Launched in 2007, its objective was to improve the country's infrastructure by focusing on energy, water, transportation, and housing.

Regarding innovation and technology, a series of policies[11] was carried out, aiming at fostering progress in key sectors of the country's productive structure, especially the auto and oil and gas industries. Furthermore, a set of actions has been taken to stimulate the development of innovative activities. In public administration, there are a few agencies responsible for the advancement of industrial competitiveness, especially in strategic sectors, such as Information and Communication Technologies (ICT), defense, biotechnology, and natural resources.

Lastly, in the education sector, the program Science Without Borders was launched in 2011. It aimed at improving the internationalization of higher education in the country, encouraging the development of innovation and the realization of research projects with internationally renowned institutions. Additionally, there was an expansion plan for the federal universities (REUNI) and a program for technical education and employment (PRONATEC).

Although advancements have occurred in these three areas, denoting a return of the State as the primary actor responsible for affecting systemic competitiveness, the issue is far from being resolved. As Bamber et al. (2014) observe, a country's insertion in GVCs should be considered beyond commercial and productive policies, in the sense that it will influence many aspects that contribute to the well-being of societies.

Some of the public policies adopted in Brazil, like social inclusion and education, will only show results in the long term. Up to now, however, it can be said that these policies have had little impact in changing the production structure and external integration. On the contrary, since 2008, there was an increase in the participation of sectors that are less technology intensive and more reliant on natural resources. This combination is leading the country to an economic dependency on the exportation of primary goods, becoming even more vulnerable to fluctuations in commodity prices and more distant from a stronger insertion in GVCs.

Few authors disagree with the idea that Brazil has to adopt a more active insertion in GVCs. After all, an insertion at the noblest parts of the chain means capturing a larger share of the value added throughout the production process and demonstrates an ability to compete internationally. The major discussion, therefore, lies in the policy proposals for carrying out such a process, mainly how to do it.

Some authors advocate a new round of economic liberalization to promote productivity growth and increased efficiency. This would mean the end to the national content policy, tax cuts, and a lower participation of the State in the policy coordination process (Bacha and De Bolle 2013). However, the results of a rapid and unplanned trade liberalization in the 1990s were disastrous for the domestic industry. As discussed in Sect. 11.2, the main result of this movement was an external insertion based primarily on natural resources. With a destabilized industrial sector and an economy based on the exportation of primary goods, it is unlikely that a new round of liberalization will promote a virtuous circle of growth and promote Brazilian companies' positions in GVC's.

On the other hand, Sturgeon et al. (2013) argue that the country should choose certain sectors to promote greater integration in the GVCs. To do this, it should abandon incentives that tend to reinforce vertical integration, conduct a tax reform to reduce and simplify the collection of taxes, improve infrastructure conditions, encourage scientific and technological development, and adopt a selective industrial policy. For them, the critical points are the "excesses" and "restrictions" of the ISI model that are still followed by many policymakers. They propose a set of six dimensions for the country to economically upgrade its position in the GVCs: (1) improving business processes, (2) products, (3) vertical integration,[12] (4) horizontal integration,[13] (5) formation of clusters,[14] and (6) scale expansion (Sturgeon et al. 2013, 149).

For Stanley (2010), the path is to advance the process of internationalizing national companies by the means of greater roles for local businesses around the world. For Brazil, this approach can be understood as a way to overcome the country's current insertion in the international division of labor. Overcoming this pattern of insertion is a complex task to an economy with so many international competitiveness problems. It means to overcome what (Prebisch 2000) placed as a major problem for Latin American economies: technical change and growth of productivity.

The institutionalism view points to the importance of the role of the State as coordinator of a country's insertion in supply chains. It emphasizes its role as supporter and facilitator of relations between States and markets, in the same way that occurred with the majority of advanced economies (Chang 2004). Thus, it requires not only an industrial policy

but also a category of national entrepreneurs investing in R & D, stimulating innovation, and taking risks. The government should provide an economic environment for that. Only then, a greater integration—especially in the noblest parts—in GVCs will be possible.

By falling behind during the times in which the first GVCs were being formed, it is now more difficult for Brazil to compete in international markets. In the past, Prebisch (2000) formulated a critical question that gave birth to the Latin American structuralist thought: how to overcome the historical slow and uneven diffusion of technical progress? Initially, the ISI model seemed to be the solution. However, this model was exhausted with the 1980s crisis. The following decade was dedicated to adjustments and the industrial policy became a non-priority. In the past ten years, the country experienced moderate growth and social improvements that the supply structure has not been able to match.

To further advance their participation in GVCs, not only Brazil but all Latin American countries should consider a greater coordination among State, national, and foreign companies to accelerate GDP, investment rate, and productivity growth. Only with the improvement of their productive structure and an increased output of high-technology products, these countries will be able to overcome a historical barrier to its development trajectory.

11.5 Concluding Remarks

This chapter discussed the external insertion of the Brazilian economy and its (lack of) participation in GVCs. The chapter presented the policy that the country pursued, with some degree of success, the ISI policies following the period after the WWII until the beginning of the 1980s, when a profound economic crisis hit the country—as well as the Latin American region—and forced policymakers to focus on short-term economic problems, instead of a long-term development agenda. With that, industrial policy was relegated to a secondary role, Brazil abandoned the ISI model, and failed to adapt its economy for the emergence of the GVCs.

As Sect. 11.2 discussed, the problem goes beyond Brazil's low participation in world trade. The poor performance can be seen as a consequence of

its external insertion. Especially after the 1980s, the country is continually becoming more specialized in the production of commodities. This is reflected in the increase of natural resources exports. So, at first, Brazil needs to rebuild its capacity to create and execute a long-term development agenda (Cano 2014; Bielschowsky 2014). Nowadays, to return to the previous model, with large and vertical companies, is a very difficult choice, since it is virtually impossible for a country with an integrated industry to compete with goods and services produced by efficient GVCs (UNCTAD 2013). In this new agenda, industrial policy needs to play a central role—altogether with social policies—in pursuing a virtuous process of income and productivity growth coupled with social inclusion.

The chapter argued that GVCs are not a panacea, especially for developing countries with large internal markets and significant existing industrial capacity. Even though GVCs can be an important avenue to build productive capacity—especially through technology dissemination and skill building—and to open up opportunities for industrial upgrading, its long-term development benefits are not automatic. They will depend on the policies adopted by the countries. In Sect. 11.3, we observed that participation in a GVC can cause a degree of dependency based on the specialization in low-technology-intensive sectors and limited value-added activities, which are coordinated at the highest levels by TNCs. Also, jobs created within GVCs can be unstable and involve poor working conditions, with work safety and health issues being a particular concern (UNCTAD 2013).

A crucial feature to understand Brazil's marginal participation in GVCs is to observe the insertion of its geographic region, Latin America. As Sect. 11.3 showed, the region has a lower participation in GVCs than other areas, including developing ones. However, the regional element is crucial for the development of GVCs. Then, a viable local integration among partners at a similar level of development, as well as assimilation into GVCs and trade in world markets should be encouraged. Regional exports can be a useful initial step toward integrating into the wider international market.

The quality of trade logistics and information technology in a region directly affects trade dynamics and, ultimately, its economic development and the growth of its productive capacities (UNCTAD 2008). Differently from the ISI period, the rationale for regional integration is no longer just

market expansion; it is now also based on the organization of GVCs, since this new type of industrialization strategy relies on stronger ties, with its supply base installed in neighboring developing economies (UNCTAD 2013).

This regional character of the GVCs reinforces the necessity for negotiating regional trade agreements and form regional blocs (Veiga and Rios 2014). In that context, it is clear that the Brazilian insertion strategy into GVCs should focus on the regional integration first. Being the biggest economy in the region, Brazil can play a central role, coordinating the supply chains in the region. In that sense, the region can achieve higher participation in GVCs and, more importantly, participate in the noblest parts of some of them.

The chapter concluded that by falling behind during the times in which the first GVCs were being formed, Brazil finds it more difficult to compete in international markets. After the exhaustion of the ISI model in the 1980s, the country did not succeed in finding a new development strategy model. First, it should seek a higher integration with its region, pursue the production and export of more value-added products, to become more apt to compete in a global market dominated by GVCs.

Summing up, to further advance its participation in GVCs, Brazil should consider having greater coordination among State, national, and foreign companies to accelerate GDP, investment rate, and productivity growth. Only with the improvement of its productive structure and an increased output of high-technology products, the country will be able to increase its participation in GVCs and overcome a historical barrier to its development trajectory.

Notes

1. Intermediate inputs represent more than half of the goods imported by OECD economies and close to three-fourths of the imports of large developing economies, such as Brazil and China (World Economic Forum 2012).
2. For authors who considered the ISI a relative success in Brazil, see, for instance, Tavares (1999) and Carneiro (2002). For the critics, see Fishlow (2013) and Paiva Abreu (1989).

3. Currency interventions which may aim at creating a competitive advantage for exporters lose relevance, as any export advantage gained from a cheaper currency is at least partially eroded by the cost of more expensive imported inputs (World Economic Forum 2012).
4. The motto of Juscelino Kubitschek's campaign for president was promoting a comprehensive project of modernization of Brazilian society with the motto "50 years in 5". Juscelino won the elections and governed Brazil in the period 1956–1961. During his mandate, he implemented the development plan promised during his campaign and was responsible for the construction of Brasilia, the current capital.
5. The control of the Brazilian inflation, which guides the main economic policy decisions since 1999, is based on the Inflation Targeting system. The main tool is the use of the basic interest rate (known as SELIC rate) that is set by the Central Bank. The center's goal since 2006 is 4.5%, with a 2% tolerance up and down. Since the beginning of the international financial crisis until 2014, the inflation remained below 6.5% but with values close to the target ceiling.
6. According to (OECD, WTO, and UNCTAD 2013), the main ones are the follows: *Size of the economy*. Large economies tend to have significant internal value chains and to rely less on foreign inputs; *Composition of exports and position in GVCs*. Countries with significant shares of natural resources, oil, or other commodities in their exports, tend to have higher relative value-added trade shares, as such exports are at the "beginning" of global value chains (GVCs) and require little foreign inputs. In contrast, countries with significant shares of exports in highly segmented industries may need to import more to generate exports and *Economic structure and export model.* Countries with significant shares of entrepôt trade, such as Hong Kong (China), Singapore, or the Netherlands, will have higher shares of foreign value added and lower shares of domestic value added in trade. Similarly, countries with important processing trade sectors will capture less domestic value added.
7. Large countries may have lower upstream participation levels, both because of the nature of their exports (natural resources and services exports tend to have less need for imported content or foreign value added) and because larger economies display a greater degree of self-sufficiency in production for exports. They may also have lower downstream participation levels because of a focus on exports of so-called final-demand goods and services, that is, those not used as intermediates in exports to third countries (Timmer et al. 2014).

8. This was the case with Japan's reconstruction in post-WWII (Teixeira 1983) and South Korea's recent development (Coutinho 1999).
9. For instance, ministerial councils, planning agencies, and public companies that were privatized.
10. For an analysis of the current role of Brazilian Development Bank (BNDES) in the Brazilian economy, see Pinto and Reis (2015).
11. Countries like China have been increasing value-added products by promoting real import substitution and adding higher value-added steps in their production processes (Morais 2012).
12. Creation of upstream and downstream links between local and global companies.
13. Intersectoral dimension. For example, seek to join similar production processes.
14. Increase the variety of products and processes to allow a greater link between companies.

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12

Mercosur's Trade Performance and the Brazilian Economy

Carlos Schönerwald, Júlia Brigoni Maciel, and Luiz Marcelo Michelon Zardo

12.1 Introduction

According to many enthusiasts of trade agreements, Mercosur's performance, especially since 1999, has been disappointing. On the one hand (qualitatively), the bloc has consolidated an exchange flow composed mainly of industrial goods, with an intra-industry trade index above 60% in 2008 (Sarquis 2011). Economic Commission for Latin America and the Caribbean (ECLAC) authors like Cimoli et al. (2005), Bielschowsky and Mussi (2013), and Bielschowsky et al. (2013) have supported a permanent exchange of goods and services with higher value added by arguing that exchange is able to unleash member states from the deep-rooted

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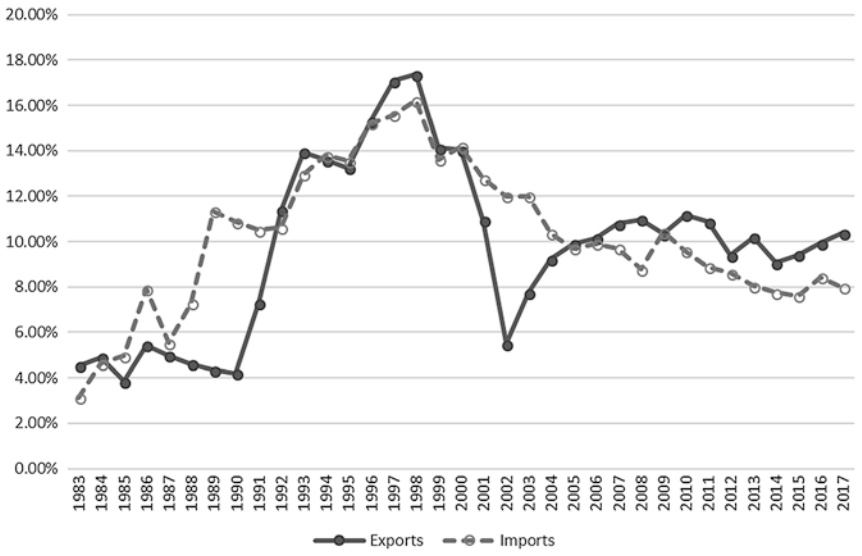
agro-exporter and low-skilled traditional industrial goods. This export pattern, according to them, is extremely harmful to the regional economy since *commodities* face a decreasing participation in the composition of the global demand and thereby a trend of falling prices accompanied by the deterioration of terms of trade (Palma 2004). Also, the low-skilled traditional industrial goods face a treat from international competitors with labor inelastic supply and low-wage economies. On the other hand (quantitatively), however, Mercosur's commercial significance for its members, after reaching a peak in 1998, soon afterwards fell sharply and then remained stable. The upward trend in the bloc's initial years, hence, was not long lasting. In the case of Brazil, the participation of the Southern Cone in its exports dropped from 17.4% in 1998 to 5.5% in 2002; the recuperation, slow and unsustainable, led it to only 10.4% in 2017 (MDIC 2018). Furthermore, Brazilian exports to and imports from Mercosur partners did show a similar pattern during the last four decades (see Graph 12.1), so it is possible to see that both went up during the 1990s but dropped again until 2017.



Graph 12.1 Participation of Mercosur in Brazilian exports and imports. (Source: Calculated by the authors on the basis of data from UN Comtrade Database (2018))

So, first of all, Mercosur's main problems are going to be analyzed through a Brazilian perspective. In view of this, we are going to discuss the causes of the bloc's quantitatively bad results (Sect. 12.2) and then how the customs union affects Brazil's trade policies (Sect. 12.3). Thereafter, our focus is on the group's qualitative success, including the evolution of trade flows in view of their complexity levels (Sect. 12.4). In the end, we are going to expose our conclusions—encompassing the prospects for the bloc in the face of the examinations made (Sect. 12.5).

12.2 Mercosur's Quantitative Failure

In this context, many hypotheses were raised in order to explain the bloc's quantitative failure. The structural asymmetry is maybe the most mentioned one, especially by authors from the smallest countries. This inclusive approach has led to the creation of Fund for Structural Convergence of Mercosur (FOCEM), which aims to promote investments capable of reducing the abovementioned heterogeneity; that is the reason why Brazil has established itself as the most important contributor, while Uruguay and Paraguay are the major beneficiaries. It should be noted, however, that this argument fails in explaining the group's weak commercial performance, since in every interdependent relationship there are inevitably asymmetries, which are precisely the basis of Ricardo's comparative advantages (Almeida 2011a).

Another criticism often made concerns the bloc's intergovernmental structure, which lacks truly supranational institutions capable of shifting loyalties from domestic groups toward them. In this regard, in the absence of an empowered bureaucracy able to guarantee the bloc's stability through sanctioning mechanisms against the members that do not obey the rules, it would not be possible to generate a trustworthy environment—precondition for the strengthening of commercial ties. Once again, the explanation is at least incomplete, since supranational institutions are essential for political cooperation and integration in specific fields such as education, public health, and technology, but not for the exchange of goods and services, whose main driving force are the gains envisaged by parties involved, according to the economic theory since Ricardo. Empirical evidence confirms that

supranationality is not imperative for narrowing commercial ties; the European Free Trade Association (EFTA), a customs union with a clear intergovernmental character, such as Mercosur, has reached a higher degree of commercial importance—in terms of the participation in imports and exports of its members—than the European Union (EU) (Baumann and Gonçalves 2015).

There is also a third hypothesis often raised to explain Mercosur's failure, more suitable than asymmetries or weak institutions. The fragile monetary and fiscal cooperation between the parties, a prerequisite for the success of a customs union, has surely impacted the bloc's cohesion. The adoption of a flexible exchange rate policy by Brazil, in 1999, for instance, compromised the balance of payments of the other member states and consequently their capacity to absorb imports. That way, the lack of economic coordination between the parties leaves them vulnerable to sudden changes. This vulnerability is reinforced by the existence of a common external tariff, which, for example, does not allow states to reduce their import taxes when a crisis provokes shortages of some goods within the bloc (occasion in which lesser import tariffs would be desirable).

Moreover, this lack of cohesion within Mercosur, alongside with the absence of institutions capable of punishing countries that disrespect the bloc's rules, allowed Argentina and Uruguay to unilaterally revoke the application of the common external tariff for capital goods (14%) in 2001. It is worth highlighting that these measures were taken immediately after the Argentine default, whose consequences included a serious recession and were devastating for both countries. Brazil and Paraguay, in front of this tough scenario, were obliged to accept the tariff suspension, which has been extended indefinitely since then. Therefore, Brazilian capital goods exports to Uruguay and Argentina were hindered, since the zero-tariff regime has attracted imports from third countries, with more competitive industries (Kume and Piani 2005).

Infringing Mercosur's rules by violating the established tariffs, besides affecting the tradable amount, also diminishes the bloc's economic quality by generating trade diversion. According to Baumann et al. (2004), while trade creation implies an improvement of economic welfare by increasing the number of goods consumed, trade diversion distorts the

allocation of resources and thus reduce the quality of the integration platform, which can be measured by the ratio of trade creation to trade diversion.

In this regard, bearing in mind the lack of political will to strengthen cooperation and rule of law within the bloc (Almeida 2011a) and to coordinate economic policies, a possible flexibilization of Mercosur by abolishing the common external tariff is increasingly being accepted in the Brazilian political scenario. Another implication of this indifference of national governments toward Mercosur consists of the perpetuation of lists of exception to the common external tariff. In 2015, the members decided to postpone the validity of these lists until 2021, even though they were initially conceived as mere transition tools with the goal of avoiding the creation of the customs union affected national economies too suddenly. It is worth remarking that this transition period should have ended in December 1994 (Kume and Piani 2005), what demonstrates that commitment to Mercosur is not strong enough to make governments confront interest groups advocating for protectionism—distributional interests are the main reason for protectionist policies.

So, it must be noted that governments have been continuously neglecting Mercosur and, therefore, lack of economic convergence and instabilities in the application of the common tariff prevent a sustainable increase in trade. The bloc's quantitative failure, hence, is related to the weak political will of members.

12.3 Mercosur and the Brazilian Trade Policies

The adoption of a common external tariff has the necessity of a joint commercial policy between the parties as one of its main implications, since import rates, a central element of international negotiations, become defined collectively. Therefore, Mercosur's external negotiation processes require coordination between its members, what generates less flexibility for bargaining and, consequently, less success in achieving agreements.

The referred rigidity results from the necessity to engender, in parallel with the external negotiation, a bargaining process within the bloc, and could be attenuated if members had convergent or well-coordinated interests materialized in the integration of economic policies (exchange rate, fiscal, and monetary policies). This is not what happens in Mercosur, and, thus, an incomplete cooperation in the economic field, combined with the lack of political will (Almeida 2011a) of the parties, makes bargain processes less successful.

In this regard, it is possible to understand the reason why Brazil, under the aegis of Mercosur, has concluded only three bilateral free trade agreements since 1995 (when the common external tariff went into effect in the Southern Cone), all of which have little economic relevance. These agreements were made with Israel, Egypt, and Palestine, but only the first two have already come into effect. On the other hand, other Latin American countries that are not part of a customs union have achieved a substantially greater commercial performance: over the same time period, Chile concluded 15 bilateral agreements (Dirección General de Relaciones Economicas Internacionales 2017) and Mexico 11 (OAS 2018).

Considering the realist thought in International Relations, one can say that a less voluminous integration makes a country more fragile internationally, reducing its relative capacities. That happens as economic vulnerability is exacerbated: in the face of a recession scenario in the main trade partners (when there are few), the supply of essential imports would certainly be reduced. The existence of a common external tariff makes this scenario especially dramatic, since this tariff does not allow the concession of tariff preferences to third countries in order to reduce the shortage of lacking goods. Brazil's participation in a customs union, while precluding an autonomous and successful commercial policy, worsens its relative position abroad and, consequently, reduces its bargaining power.

The said correlation fosters a security dilemma (Gilpin 2001); the countries that "stay behind" in the integration process feel weaker when compared to the others, since they become more economically vulnerable. This process explains, for example, North American Free Trade Agreement (NAFTA' s) creation as a response to the release of the EU. In Brazil's case, regarding Mercosur, the idea of abolishing the common external tariff gets increasingly widespread, since many economists and

political groups believe that it would enable Brazil to deal with this dilemma by allowing an autonomous commercial policy capable of concretizing a bigger number of free trade agreements.

Even though the criticism about trade agreements, bad result in trade negotiations are not inexorable in customs unions. EFTA, for instance, also a customs union, has already reached 27 free trade agreements (EFTA 2018) thanks to its members' joint efforts and economic cohesion. It may therefore be concluded that stronger political will within Mercosur could be capable of overcoming the difficulties of bargaining linked to customs unions.

12.4 Mercosur's Qualitative Success

Mercosur has succeeded in promoting the exchange of manufactured rather than agricultural goods, in accordance with the claims from ECLAC's scholars, who have identified a trend toward the deterioration of the balance of payments of countries following the agro-exporter model due to the worsening of terms of trade.

Brazil's case is paradigmatic. While in 2008 the participation of natural goods in Brazilian exports to China, its main commercial partner, reached 90% (Cunha 2011), its trade relations with Argentina, Uruguay, and Paraguay remained centered in processed goods. According to Itamaraty (Ministério das Relações Exteriores 2017), as Brazil's ministry of foreign affairs is popularly known, industrialized products compose 92% of the Brazilian exports to these countries. The following table exposes the evolution of the composition of Brazilian exports to its partners in Mercosur according to the Standard International Trade Classification (SITC—Rev. 2) (Table 12.1).

These data allow us to conclude that most of Brazilian exports to Argentina, Uruguay, and Paraguay are medium-technology manufactures, with a higher added value than *commodities*, predominant in Brazil's trade flows with the United States, the EU, and China (Sarquis 2011).

At the same time, one can note the absence of high-technology manufactures in the list of the most important Brazilian exports to Mercosur. This fact can be comprehended in the light of the third generation of ECLAC's structuralism (the new ECLAC).

Table 12.1 Brazilian exports to Mercosur

	1991		2000		2010		2016	
SITC	US$	Perc.	US$	Perc.	US$	Perc.	US$	Perc.
COMMODITIES	261,068,980	11.33%	595,911,995	7.71%	1,791,363,888	7.94%	2,645,408,762	14.41%
High-technology manufactures	129,746,807	5.63%	1,067,255,047	13.82%	2,235,184,557	9.90%	881,398,133	4.80%
Low-technology manufactures	395,791,047	17.18%	1,396,251,985	18.08%	2,539,440,730	11.25%	1,884,684,139	10.27%
Medium-technology manufactures	1,025,905,786	44.53%	3,225,529,239	41.76%	12,329,462,677	54.62%	10,381,594,534	56.57%
Natural resource-based manufactures	487,474,062	21.16%	1,418,701,600	18.37%	3,300,612,591	14.62%	2,504,153,048	13.65%
OTHER TRANSACTIONS	4,014,879	0.17%	20,758,663	0.27%	375,557,988	1.66%	54,900,159	0.30%
	2,304,001,561		7,724,408,529		22,571,622,431		18,352,138,775	

Source: Calculated by the authors on the basis of the UN Comtrade Database (2018)

The Chilean economist Fernando Fajnzylber has incorporated technological considerations to his work, with the inspiration of neo-Schumpeterian theory (Santos and Oliveira 2008). There would be leading and following countries, and the innovations associated to high-technology industries would be developed by the national innovation systems of the leaders. This idea is similar to Gabriel Palma's notion of "flying geese and vulnerable ducks" (Palma 2004).

Since Latin American countries have an incipient technological innovation nucleus, they merely absorb innovations made in northern countries. According to Fajnzylber (as cited in Santos and Oliveira 2008), this process is boosted by the actuation of multinational companies, since subsidiaries in Latin America generally import their equipment from their head offices. Without a catching-up process, it is possible to comprehend the difficulties faced by Latin American countries to develop high-technology industries, in which innovations are generally concentrated, and thus to reach a competitive level in this kind of exports.

The main findings for Brazil's exports to Mercosur can be generalized for all other trade flows within Mercosur, as data provided by the United Nations Comtrade Database (2018) demonstrate (Tables 12.2, 12.3 and 12.4).

Table 12.2 Exports from Argentina to Uruguay (2016)

Good	Value ($)	Classification (SITC—Rev. 2)
Feeding stuff for animals (not including unmilled cereals)	55,928,831	Commodities
Barley, unmilled	13,428,976	Commodities
Gas, natural and manufactured	42,323,876	Commodities
Cereal, flour, or starch preparations of fruits or vegetables	36,962,990	Natural resource-based manufactures
Soap, cleansing and polishing preparations	36,706,978	Medium-technology manufactures
Mineral manufactures, nes	7,700,464	Natural resource-based manufactures
Sugar and honey	10,160,555	Natural resource-based manufactures
Lime, cement, and fabricated construction materials	8,997,508	Natural resource-based manufactures
Non-alcoholic beverages, nes	11,917,051	Natural resource-based manufactures
Fixed vegetable oils, soft, crude, refined, or purified	16,686,243	Natural resource-based manufactures

Source: UN Comtrade Database (2018)

Table 12.3 Exports from Argentina to Brazil (2016)

Good	Value ($)	Classification (SITC—Rev. 2)
Passenger motor vehicles (excluding buses)	1,456,897,950	Medium-technology manufactures
Lorries and special purposes motor vehicles	1,443,097,308	Medium-technology manufactures
Wheat and meslin, unmilled	784,075,968	Commodity
Polymerization and copolymerization products	480,102,373	Medium-technology manufactures
Motor vehicle parts and accessories, nes	403,834,013	Medium-technology manufactures
Cereal, flour or starch preparations of fruits or vegetables	299,156,219	Natural resource-based manufactures
Maize, unmilled	277,048,389	Commodities
Internal combustion piston engines, and parts thereof, nes	202,546,736	Medium-technology manufactures
Fruit and nuts, fresh, dried	171,063,287	Commodities
Pesticides, disinfectants	154,550,769	Medium-technology manufactures

Source: UN Comtrade Database (2018)

Table 12.4 Exports from Argentina to Paraguay (2016)

Good	Value ($)	Classification (SITC—Rev. 2)
Petroleum products, refined	130,382,377	Natural resource-based manufactures
Pesticides, disinfectants	75,121,042	Medium-technology manufactures
Lorries and special purposes motor vehicles	65,372,274	Medium-technology manufactures
Medicinal and pharmaceutical products	50,745,533	High-technology manufactures
Alcoholic beverages	35,911,469	Natural resource-based manufactures
Cereal, flour, or starch preparations of fruits or vegetables	33,990,571	Natural resource-based manufactures
Paper and paperboard, precut, and articles of paper or paperboard	32,648,126	Low-technology manufactures
Edible products and preparations, nes	32,279,819	Natural resource-based manufactures
Perfumery, cosmetics, toilet preparations, etc.	26,742,907	Medium-technology manufactures
Soap, cleansing and polishing preparations	24,635,189	Medium-technology manufactures

Source: UN Comtrade Database (2018)

As the data provided for Argentina demonstrate, commodities play a minor role in its exports to Mercosur. The importance of medium-technology manufactures is remarkable, especially in sales to Brazil and Paraguay.

However, when we look at the exports from Argentina to Uruguay, it is possible to see that they trade largely commodities and natural resource-based manufactures—relatively low degree of added value (higher than commodities, however). This fact may be better comprehended by taking into account Brazilian exports to Uruguay. While Argentina has no land border with Uruguay, Brazil and this small country share six connection points by land. In addition, the geographic proximity between Montevideo and Rio Grande do Sul, the Brazilian most southern state, where one can find competitive mechanical, chemical, and footwear industries, harms Argentine competitivity in the Uruguayan market of medium-technology manufactures. Brazilian exports to Uruguay are shown in Table 12.5.

Table 12.5 Exports from Brazil to Uruguay (2016)

Good	Value ($)	Classification (SITC—Rev. 2)
Crude petroleum and oils obtained from bituminous minerals	1,340,139,642	Commodities
Passenger motor vehicles (excluding buses)	126,088,470	Medium-technology manufactures
Tea and mate	69,475,721	Commodities
Meat and edible meat offal, fresh, chilled, or frozen	68,381,999	Commodities
Lorries and special purposes motor vehicles	62,623,936	Medium-technology manufactures
Polymerization and copolymerization products	50,532,003	Medium-technology manufactures
Aircraft and associated equipment, and parts thereof, nes	48,100,411	High-technology manufactures
Furniture and parts thereof	42,596,945	Low-technology manufactures
Mechanical handling equipment, and parts thereof, nes	36,487,796	Medium-technology manufactures
Sugar and honey	36,233,503	Natural resource-based manufactures

Source: UN Comtrade Database (2018)

Argentine exports to its Mercosur's partners, hence, are endowed with a higher added value than its global exports, as data provided by MIT (2018) demonstrate. In 2016, soybean meal (16%), corn (7%), soybean oil (6.9%), soybeans (5.5%), delivery trucks (4.2%), gold (3.2%), wheat (3%), industrial fatty acids, oils, and alcohols (2.1%), crustaceans, (1.8%) and tanned equine and bovine hides (1.6%) were the country's more significant exports. Excluding delivery trucks and industrial fatty acids, oils and alcohols, all other sales are commodities or natural resource-based manufactures, what allows us to conclude that trade between Argentina and its neighboring countries in the Southern Cone is more important than trade with third countries in promoting the Argentine industry.

The data shown in Tables 12.6, 12.7, and 12.8 demonstrate a relevant participation of industrialized goods in Uruguayan exports to Mercosur's members—excellent results if one considers the traditional focus on agriculture of its economy, especially on livestock. In this context, Uruguay

Table 12.6 Exports from Uruguay to Argentina (2016)

Good	Value ($)	Classification (SITC—Rev. 2)
Equipment for distribution of electricity	45,017,934	Medium-technology manufactures
Polymerization and copolymerization products	32,258,822	Medium-technology manufactures
Soap, cleansing and polishing preparations	27,445,850	Medium-technology manufactures
Seeds and oleaginous fruit, whole or broken, for "soft" fixed oil	26,246,372	Commodities
Paper and paperboard	22,480,362	Natural resource-based manufactures
Medicinal and pharmaceutical products	22,302,929	High-technology manufactures
Furniture and parts thereof	20,762,439	Low-technology manufactures
Margarine and shortening	19,139,442	Commodities
Articles, nes of plastic materials	11,626,932	Low-technology manufactures
Tube, pipes, and fittings of iron or steel	9,203,155	Medium-technology manufactures

Source: UN Comtrade Database (2018)

Table 12.7 Exports from Uruguay to Brazil (2016)

Good	Value ($)	Classification (SITC—Rev. 2)
Milk and cream	271,279,988	Commodities
Cereal, flour, or starch preparations of fruits or vegetables	112,315,478	Natural resource-based manufactures
Rice	100,892,124	Commodities
Meat and edible meat offal, fresh, chilled or frozen	87,496,455	Commodities
Articles, nes of plastic materials	77,250,562	Low-technology manufactures
Cheese and curd	58,812,760	Natural resource-based manufactures
Margarine and shortening	51,928,939	Commodities
Wheat and meslin, unmilled	46,792,854	Commodities
Materials of rubber	43,091,134	Natural resource-based manufactures
Tube, pipes, and fittings of iron or steel	32,197,427	Medium-technology manufactures

Source: UN Comtrade Database (2018)

Table 12.8 Exports from Uruguay to Paraguay (2016)

Good	Value ($)	Classification (SITC—Rev. 2)
Medicinal and pharmaceutical products	15,644,315	High-technology manufactures
Tobacco, manufactured	15,604,382	Low-technology manufactures
Fertilizers, manufactured	10,757,771	Medium-technology manufactures
Paper and paperboard, precut, and articles of paper or paperboard	9,352,686	Low-technology manufactures
Cereal, flour or starch preparations of fruits or vegetables	6,796,225	Natural resource-based manufactures
Lime, cement, and fabricated construction materials	4,576,994	Natural resource-based manufactures
Furniture and parts thereof	4,150,437	Low-technology manufactures
Soap, cleansing and polishing preparations	3,666,578	Medium-technology manufactures
Pesticides, disinfectants	3,202,716	Medium-technology manufactures
Aluminum	2,569,298	Natural resource-based manufactures

Source: UN Comtrade Database (2018)

faces the same situation as Brazil and Argentina: its exports to neighboring nations of the Southern Cone have a higher added value than its exports to third countries. According to the MIT (2018), Uruguay's main exports in 2016 were sulfate chemical wood pulp (13%), frozen bovine meat (12%), soybeans (11%), rice (4.6%), tanned equine and bovine hides (4.3%), bovine meat (4.2%), concentrated milk (4%), scented mixtures (3.4%), packaged medicaments (2.5%), bovine bone (2.1%), and cheese (1.4%).

The data show that, in the case of Paraguay, commodities and natural resource-based manufactures are the most significant exports to partners within Mercosur. This fact, however, can be understood by taking into account the development challenges faced by the country since the Paraguayan War (1864–1870), in which the nation got destroyed and its incipient industrial efforts were scrapped. The male workforce was almost abolished, and the reconstruction process took a long time, especially in the face of the economic strengthening of Brazil and Argentina. Being landlocked and a rural country, with many indigenous communities, delayed Paraguay's industrial renaissance until the second half of the twentieth century, and its economy is still predominantly agricultural albeit the "miracle of the 21th century" (Sainz 2013).

One should also underline that exports of electric current are ranked first in Tables 12.9 and 12.10 (trade with Argentina and Brazil, respectively) because of the binational hydroelectrical dams of Yacyretá and Itaipú.

If Paraguay's exports to partners in Mercosur are mainly composed of commodities and natural resource-based manufactures, its exports to third countries are endowed with an even lesser degree of added value, as the data provided by MIT (2018) demonstrate. In 2016, Paraguayan main exports were electricity (23%), soybeans (21%), soybean meal (10%), frozen bovine meat (6.4%), bovine meat (5.4%), soybean oil (5.1%), corn (4.7%), rice (2.2%), wheat (1.8%), and insulated wire (1.6%) (Table 12.11).

Table 12.9 Exports from Paraguay to Argentina (2016)

Good	Value ($)	Classification (SITC—Rev. 2)
Electric current	406,355,292	Other transactions
Seeds and oleaginous fruit, whole or broken, for "soft" fixed oil	406,355,292	Commodities
Fixed vegetable oils, soft, crude, refined, or purified	56,891,148	Natural resource-based manufactures
Equipment for distribution of electricity	21,980,060	Medium-technology manufactures
Petroleum products, refined	18,679,768	Natural resource-based manufactures
Paper and paperboard	11,957,428	Natural resource-based manufactures
Ships, boats and floating structures	11,203,643	Medium-technology manufactures
Glassware	9,652,677	Low-technology manufactures
Fruit and nuts, fresh, dried	9,603,247	Commodities
Crude animal materials, nes	6,448,893	Commodities

Source: UN Comtrade Database (2018)

Table 12.10 Exports from Paraguay to Brazil (2016)

Good	Value ($)	Classification (SITC—Rev. 2)
Electric current	1,724,149,623	Other transactions
Maize, unmilled	264,303,295	Commodities
Rice	149,142,761	Commodities
Wheat and meslin, unmilled	146,645,243	Commodities
Meat and edible meat offal, fresh, chilled, or frozen	135,274,641	Commodities
Equipment for distribution of electricity	124,492,542	Medium-technology manufactures
Seeds and oleaginous fruit, whole or broken, for "soft" fixed oil	120,652,890	Commodities
Articles, nes of plastic materials	56,263,137	Low-technology manufactures
Made-up articles, wholly or chiefly of textile materials, nes	40,283,728	Low-technology manufactures
Animal oils and fats	20,898,821	Natural resource-based manufactures

Source: UN Comtrade Database (2018)

Table 12.11 Exports from Paraguay to Uruguay (2016)

Good	Value ($)	Classification (SITC—Rev. 2)
Seeds and oleaginous fruit, whole or broken, for "soft" fixed oil	52,039,262	Commodities
Feeding stuff for animals (not including unmilled cereals)	27,866,500	Commodities
Maize, unmilled	18,400,536	Commodities
Leather	8,956,801	Low-technology manufactures
Meat and edible meat offal, fresh, chilled, or frozen	7,777,472	Commodities
Undergarments, knitted or crocheted	4,681,451	Low-technology manufactures
Petroleum products, refined	4,360,880	Natural resource-based manufactures
Fixed vegetable oils, soft, crude refined, or purified	3,325,762	Natural resource-based manufactures
Medicinal and pharmaceutical products	2,985,691	High-technology manufactures
Wood, simply worked, and railway sleepers of wood	2,964,934	Natural resource-based manufactures

Source: UN Comtrade Database (2018)

12.5 Conclusion

Our main conclusion is that Mercosur plays an essential role for Brazil and its other members as long as it provides them a forum for exchanging goods with higher added value. In the case of Brazil, specifically, its industrialized products have an enormous importance in trade within the Southern Cone in comparison to bilateral relations with China, the United States and the EU (Sarquis 2011).

Nonetheless, these merits may not overshadow the increasing problems faced by Mercosur's institutions. The lack of monetary and fiscal cooperation prevents a sustainable growth of interdependence, since internal shocks of big economies (Brazil and Argentina) make the other countries vulnerable and defenseless. Political goodwill is still absent, and this provokes severe institutional crises such as the perpetuation of exception lists for the common external tariff and many unilateral acts like Argentina and Uruguay's revocation of the common external tariff for capital goods.

While these problems remain, Mercosur's members have been trying to hide them through ambitious, but not essential, purposes. If, on the one hand, plans for direct elections for Parlasur (Mercosur's Parliament) and the creation of FOCEM can reduce the bloc's democratic deficit and economic disparities within the Southern Cone, they are not able to deal with the root of the weak trade links between members.

Therefore, it is possible to conclude that Mercosur is potentially a very important instrument for the development of national industries. This potential, however, can be carried out only if members display a greater willingness to stretch bonds by converging their economic policies and observing the bloc's rules.

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13

Global Implications of International Integration of the Brazilian Economy

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13.1 The Concept of International Integration

International integration of individual countries takes place within an economic, cultural, institutional, and political domain. It can be country specific, product specific, regional, or universal.

International integration involves imports and exports not only of goods and capital but also of ideas, information, and norms. An important implication of such interactions leading to international integration is the alteration of the people who participate in them (Sandholtz and Gray 2003). Interactions that lead to international integration affect the way people dress, or the music they listen to, but also promote major policy shifts and reshape the domestic economies and politics of the countries. The economic implications, though, are more profound, and these are the ones we will focus on.

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International economic integration or globalization of a national economy is defined as "the increasing freedom and ability of individuals and firms to undertake voluntary economic transactions with residents of other countries, a process entailing a growing contestability of national markets by foreign suppliers" (Brahmbhatt 1998, p. 2). According to Randolph (2001, p. 5), international economic integration is "the ever-closer knitting together of a one-world economy". The outcome of international integration is "globalization". The Organization for Economic Cooperation and Development (OECD) defines globalization as "a dynamic and multidimensional process of economic integration whereby national resources become more and more internationally mobile while national economies become increasingly interdependent" (OECD 2005, p. 11).

International integration can entail an increase in *extensive margins*,[1] the number of bilateral relationships with a larger number of countries, or growth in *intensive margins*,[2] the volume of trade interactions per relationship or per individual country (Helpman et al. 2007).

13.2 International Integration of the Brazilian Economy

Brazil has made conscientious efforts to integrate with the national economies of its neighboring countries within the institutional structure of Mercosur, the regional group of economic integration for South America. Brazil's economic integration with member countries of Mercosur is addressed in Chap. 12 of this book and will not be discussed as a separate topic in this chapter.

The following tables report *descriptive statistics* intended to summarize information on the characteristics of Brazil's international trade for a better understanding of Brazil's integration with the world economy.

Table 13.1 reports Brazil's standing in terms of its intensive and extensive margins of international integration and compares it to that of the emerging economies of Russia, India, and China, also known by the acronym BRIC countries and to two Latin American economies, Argentina and Mexico.

Table 13.1 shows that, in 2016, Brazil, for example, imported 4,298 products from 212 import partners at a value of 137,552.00 million USD and exported 4,068 products to 220 export partners at a value of 185,235.40

Table 13.1 Number of exported and imported products, partners, and value of Brazil compared with BRIC and Latin American emerging economies in 2016

Country	Number of exported products	Number of export partners	Value of exports (in mil. USD)	Number of imported products	Number of import partners	Value of imports (in mil. USD)
Brazil	4,068	220	185,235	4,298	212	137,552
Russia	4,350	199	285,491	4,421	220	182,257
India	4,411	219	260,327	4,310	211	356,705
China	4,417	213	2,097,637	4,456	212	1,587,921
Mexico	4,212	203	373,883	4,457	223	387,064
Argentina	3,353	185	57,733	4,043	175	55,610

Source: World Integrated Trade Solution (WITS), World Bank (6/19/2018). https://wits.worldbank.org/CountryProfile/en/Country/BRA/Year/2016/Summary

million USD, resulting in a positive trade balance of 47,683.40 million USD (World Bank 2018). In terms of the internal structure of their extensive margin of international integration, Brazil, India, China, and Argentina have a larger number of export partners than import partners. The Russian Federation and Mexico[3] have the opposite trade pattern, that is, fewer export partners than import partners. However, in terms of their intensive margin of international integration all, with the exception of India, have a larger number of imports than exports.

As a result of their extensive and intensive margins of international economic integration and the world prices of their traded products, Brazil, Russia, China, and Argentina had a higher value of exports than imports, experiencing trade surpluses of 48, 103, 510, and 2 billion USD respectively, in 2016, while India and Mexico had a lower USD value of exports than imports, experiencing trade deficits of 96 and 13 billion USD, respectively, in 2016. In other words, the international economic integration of Brazil, Russia, China, and Argentina in 2016 produced monetary profits of the magnitude of their trade surplus, while the international economic integration of India and Mexico in 2016 produced monetary loss of the magnitude of their trade deficits.

Table 13.2 summarizes the number of *traded products* (exported plus imported) of the BRIC countries and two Latin America economies, Argentina and Mexico, the number of their *trade partners* (exporters plus importers), the USD value of their trade in 2016 (exports plus imports) along with a ranking among themselves.

Table 13.2 International integration by intensive and extensive margins. Number of traded products, trade partners, and value of 2016 trade. Ranking of Brazil with BRIC and Latin American emerging economies

	Intensive margin		Extensive margin			
Country	Number of traded products	Ranking by number of traded products	Number of trade partners	Ranking by number of trade partners	Value of trade (in mil. USD)	Ranking by value of trade
Brazil	8,366	5	432	1	322,787	5
Russia	8,771	2	419	5	467,748	4
India	8,721	3	430	2	617,032	3
China	8,873	1	425	4	3,685,558	1
Argentina	7,396	6	360	6	113,343	6
Mexico	8,669	4	426	3	760,947	2

Source: World Integrated Trade Solution (WITS), World Bank (6/19/2018). https://wits.worldbank.org/CountryProfile/en/Country/BRA/Year/2016/Summary

Table 13.2 reveals that Brazil ranks first in terms of the number of trade partners (432 of them) among four BRIC and two large Latin American countries, that is, in terms of extensive margin of international economic integration. However, Brazil ranks fifth in terms of the number of traded products (8,366 of them), that is, in terms of intensive margin of international economic integration. China, India, Russia, and Mexico exhibit an opposite pattern of international economic integration. China, for example, ranks fourth in terms of trade partners (425 of them, or, 7 fewer trade partners than Brazil), but it ranks first in terms of the number of traded products (8,669 of them, or, 507 traded products more than Brazil). Brazil is slightly better integrated with the world economy than China in terms of extensive margins but significantly worse integrated with the world economy than China in terms of intensive margins. The USD value of traded products by each country records the economic weight of a country's integration with the world economy. Brazil ranks fifth among the six countries compared in Table 13.2. Brazil is the least integrated country in this group in terms of the number of products traded and also in terms of the USD value of those products.

Table 13.3 reports Brazil's standing in intensive and extensive margins of international economic integration as compared with the advanced economies of the US, Japan, Germany, the UK, France, Russia, and Italy, also

Table 13.3 Number of export and import products, trade partners, and value of trade of Brazil compared to the G7 advanced economies

Country	Number of exported products	Number of export partners	Value of exports (in mil. USD)	Number of imported products	Number of import partners	Value of imports (in mil. USD)
UK	4,501	230	411,463	4,539	226	636,368
US	4,563	223	1,450,457	4,558	220	2,248,209
Russia	4,350	199	285,491	4,421	220	182,257
Germany	4,420	234	1,340,752	4,525	226	1,060,672
France	4,373	229	488,885	4,572	233	560,555
Italy	4,471	225	461,529	4,563	213	404,578
Japan	4,230	213	644,932	4,453	212	606,924
Brazil	4,068	220	185,235	4,298	212	137,552

Source: World Integrated Trade Solution (WITS), World Bank (6/19/2018). https://wits.worldbank.org/CountryProfile/en/Country/BRA/Year/2016/Summary

known as the Group of Seven (*G7*) *advanced economies* or the *G7 countries*, which are expected to have grasped and sustained the highest current levels of international economic integration with the world economy.

The descriptive statistics of Table 13.3 reveal that Brazil exhibited the lowest extensive and intensive margins of international integration (the lowest number of import and export partners and imported and exported products) compared to the G7 advanced economies in 2016. It also exhibited the lowest USD value of imports and exports.

Although the magnitude of the extensive and intensive margins of international integration for Brazil was the lowest, compared to the extensive and intensive margins of international integration for the G7 countries, those margins for Brazil were "relatively" comparable to the corresponding margins of the G7 countries. Comparing Brazil, for example, to the high integrated economies of the US and Germany, we observe that Brazil imported 4,298 products (compared to 4,558 imported products by the US and 4,525 by Germany) from 212 import partners (compared to 220 import partners for the US and 226 for Germany) at a value of 137,552 million USD (compared to 2,248,209 million USD for the US and 1,060,672 for Germany) and exported 4,068 products (compared to 4,563 products by the US and 4,420 by Germany) to 220 export partners (compared to 223 export partners for the US and 234 for Germany) at a value of 185,235 million USD (compared to 1,450,457 million

USD for the US and 1,340,752 for Germany), resulting in a positive trade balance of 47,683 million USD (compared to a negative trade balance of −797,752 million USD for the US and a positive trade balance of 280,080 million USD for Germany) (World Bank 2018).

Brazil's USD value of imports and exports was also the lowest compared to that of the G7 countries, but it was not comparable to them at all. Instead, it was significantly lower than the USD value exhibited by the G7 countries. These statistics document that Brazil's international economic integration consists predominantly of trade on low market-value products, while the international economic integration of the G7 advanced economies consists predominantly of trade on high market-value products.

Table 13.3 also reveals that Brazil, the UK, the US, Germany, Italy, and Japan have a larger number of export partners than import partners in terms of the internal structure of their extensive margin of international integration. The Russian Federation and France have the opposite trade pattern, that is, fewer export partners than import partners. However, in terms of their intensive margin of international integration, all, with the exception of the US, have a larger number of imported products than exported products.

As a result of their extensive and intensive margins of international economic integration and the world prices of their traded products, Brazil, Russia, Germany, Italy, and Japan had a higher USD value of exports than imports, experiencing, in 2016, trade surpluses of 48, 103, 280, 57 and 38 billion USD respectively, while the UK, the US and France had a lower USD value of exports than imports, experiencing trade deficits of 225, 798, and 72 billion USD, respectively. In other words, the international economic integration of Brazil, Russia, Germany, Italy, and Japan produced monetary profits of the magnitude of their trade surplus in 2016 (of 526 billion USD for those five countries), while the international economic integration of the UK, the US, and France produced a monetary loss of the magnitude of their trade deficits in 2016 (of 1,094 billion USD for those three countries).

Of course, the information content of a sample of one observation for each country for 2016 cannot reveal the long-term benefit or cost from a country's international economic integration with the world economy, but it can show that the impact of international economic integration is not

Table 13.4 International integration by intensive and extensive margins. Number of export and import products, trade partners, and value of trade. Ranking of Brazil with the G7 advanced economies

	Intensive margin		Extensive margin			
Country	Number of traded products	Ranking by number of traded products	Number of trade partners	Ranking by number of trade partners	Value of trade (in mil. USD)	Ranking by value of trade
Brazil	8,366	8	432	6	322,787	8
France	8,945	5	462	1	1,049,440	4
Germany	8,945	4	460	2	2,401,424	2
Italy	9,034	2	438	5	866,107	6
Japan	8,683	7	425	7	1,251,856	3
Russia	8,771	6	419	8	467,748	7
UK	9,040	2	456	3	1,047,831	5
US	9,121	1	443	4	3,698,666	1

Source: World Integrated Trade Solution (WITS), World Bank (6/19/2018). https://wits.worldbank.org/CountryProfile/en/Country/BRA/Year/2016/Summary

identical for every country. Brazil, an emerging economy, and four of the advanced economies, Russia, Germany, Italy, and Japan, enjoyed a positive trade balance in 2016, while the three advanced economies of the UK, the US, and France suffered a negative trade balance. Although the trade balance should not be the only metric used for the assessment of costs and benefits following a county's openness to the world in a process of international integration, it does provide a basis for identifying benefits and costs.

Table 13.4 summarizes the number of traded products of the G7 countries, the number of their trade partners, and the USD value of their trade in 2016 along with a ranking among themselves.

Table 13.4 shows that Brazil ranks last in terms of intensive margin in comparison to the G7 countries and worse than all of them, except for Japan and the Russian Federation in terms of extensive margin. Table 13.4 also shows that Brazil has only 11 fewer (= 443 – 432) trade partners than the US but 755 fewer (= 9,121 – 8,366) traded products than the US. Although the world integration of the Brazilian economy is relatively less extensive that the integration of the US economy, Brazil's world economic integration is significantly less intensive than the world integration of the US economy. Compared with Japan and Russia, Brazil is more integrated in terms of its extensive margin but less integrated in terms of

its intensive margin. Brazil has 7 more (= 432 – 425) trade partners than Japan and 13 more (= 432 – 419) than Russia, but it has 317 fewer (= 8,683 – 8,366) traded products than Japan and 405 fewer (= 8,771 – 8,366) traded products than Russia.

Brazil's USD value of international trade (322,787 million USD) was also the lowest compared to that of the G7 countries, and it was significantly lower than the one exhibited by the top internationally integrated economies of the US (3,698,666 million USD value of international trade) and Germany (2,401,424 million USD value of international trade). These statistics document that Brazil's international economic integration had a relatively small economic impact on the world economy in terms of its USD value of trade when compared to the impact of the advanced economies of the US and Germany in 2016.

Table 13.5 presents Brazil's top five export and import partners by millions of USD value of trade.

Table 13.5 shows that the largest buyer of Brazil's exports in 2016 was China, with a value of 35.13 billion USD, representing 18.97 percent of Brazilian exports, followed by the US, Argentina, Netherlands, and Germany. The largest supplier of Brazil's imports is the US with a value of 24.10 billion USD, representing 17.52 percent of Brazil's imports, followed by China, Germany, Argentina, and the Republic of South Korea.

The value of the top five, out of a total of 220 export partners of Brazil, represents 46.98 percent of the total Brazilian exports, while the value of the top five, out of a total of 212 import partners of Brazil, represents 51.36 percent of the total Brazilian imports.

Table 13.6 presents the top five export and import products of Brazil.

Table 13.5 Brazil's top five export and import partners in 2016

Rank	Export partner	Value (in mil. USD)	Partner share (%)	Rank	Import partner	Value (in mil. USD)	Partner share (%)
1	China	35,133.59	18.97	1	US	24,099.79	17.52
2	USA	23,299.98	12.58	2	China	23,363.99	16.64
3	Argentina	13,417.67	7.24	3	Germany	9,130.74	6.64
4	Netherlands	10,322.80	5.57	4	Argentina	9,084.49	6.60
5	Germany	4,860.82	2.62	5	S. Korea	5,448.58	3.96

Source: World Integrated Trade Solution (WITS), World Bank (6/19/2018). https://wits.worldbank.org/CountrySnapshot/en/BRA

Table 13.6 Brazil's top five traded products (Exports and imports) at HS 6-digit level

Rank	Top five out of 4068 exported product in 2016	Value in USD
1	Soybeans	19,331,323.26
2	Non-agglomerated iron ores and concentrates	11,575,969.90
3	Petroleum oils and oils obtained from bituminous	10,073,804.87
4	Raw cane sugar, in solid form	8,282,160.99
5	Oil cake and other solid residues, of soybean	5,192,780.70
Rank	Top five out of 4298 imported product in 2016	Value in USD
1	Refined Petroleum	7,299,340.41
2	Petroleum oils and oils obtained from bituminous	2,898,856.27
3	Monolithic integrated circuits	2,800,390.44
4	Other medicaments of mixed or unmixed products	2,447,032.24
5	Parts of electrical apparatus for line telephone	2,223,341.88

Source: World Integrated Trade Solution (WITS), World Bank (6/19/2018). https://wits.worldbank.org/CountrySnapshot/en/BRA

Brazil maintains relatively limited ties to the rest of the world beyond its resource exports and continues to look for external opportunities. The value of its top five exports represents 29.40 percent of total exports in Brazil, and its top five imports represent 12.84 percent of total imports in Brazil.

13.3 International Trade Logistics Performance of Brazil Compared to the BRIC and G7 Countries

Factors facilitating international trade are expected to increase the speed of a country's international integration. One such factor measures the efficiency of a country's international trade logistics performance, using six core components: customs, infrastructure, international shipments, logistics quality and competence, tracking and tracing, and time lines. The World Bank has developed an international trade logistics performance index (LPI) for 160 countries, which can be used for ranking and assessing their potential to support their economic integration with the world economy.

The LPI is a multidimensional assessment of international trade logistics performance, rated on a scale from 1 to 5 (worst to best). The above mentioned six core components captured by the LPI survey are rated by respondents on a scale of 1–5, where 1 is very low or very difficult and 5 is very high or very easy. The relative LPI score of this index is obtained by normalizing the LPI score: percentage of highest performer = 100 × (LPI – 1)/(LPI highest – 1). The top five countries in 2016 were led by Germany, the highest performer with a maximum relative LPI score of 100, followed by Luxembourg with a relative LPI score of 99.80, Sweden with 99.34, the Netherlands with 99.34, and Singapore with 98.81. The worst five countries were Equatorial Guinea with a relative LPI score of 27.25, Mauritania with 26.84, Somalia with 23.16, Haiti with 22.20, and the Syrian Arab Republic with 18.55 (See: Logistics Performance Index 2016, https://wb-lpi-media.s3.amazonaws.com/LPI_Report_2016.pdf).

Table 13.7 reports LPI scores for Brazil and the other BRIC countries.

Brazil's international trade logistics performance in 2016 was not as good as China and India but better than the Russian Federation. In terms

Table 13.7 Rankings of trade logistics performance of the BRIC emerging economies

Country		India	China	Brazil	Russia
overall LPI score	Score	3.42	3.66	3.09	2.57
overall LPI rank	Rank	35	27	55	99
	% of highest performer	75.02	82.49	64.72	48.69
Customs	Score	3.17	3.32	2.76	2.01
	Rank	38	31	62	141
Infrastructure	Score	3.34	3.75	3.11	2.43
	Rank	36	23	47	94
International shipments	Score	3.36	3.70	2.90	2.45
	Rank	39	12	72	115
Logistics quality and competence	Score	3.39	3.62	3.12	2.76
	Rank	32	27	50	72
Tracking and tracing	Score	3.52	3.68	3.28	2.62
	Rank	33	28	45	90
Timeliness	Score	3.74	3.90	3.39	3.15
	Rank	42	31	66	87

Source: Jean-François Arvis et al. (2016). https://wb-lpi-media.s3.amazonaws.com/LPI_Report_2016.pdf

of overall LPI score, China was ranked 27th, out of 160 countries, India was 35th, Brazil was 55th, and the Russian Federation was 99th. The top logistics performer in 2016 was Germany, ranked first, with the maximum relative LPI score of 100. China had a relative LPI score of 82.49 (as a percent of the highest performer, Germany), India 75.02, Brazil 64.72, and the Russian Federation 48.69. Brazil was also not as good as China and India, but better than the Russian Federation, in each of the above mentioned six core components captured by the LPI survey.

Table 13.8 reveals how far away Brazil was assessed to be from the G7 countries in terms of its logistics performance on international trade in 2016.

Brazil's international trade logistics performance in 2016 was significantly worse than that of Germany, the UK, the US, Japan, France, and Italy, but better than that of the Russian Federation. In terms of their overall LPI score, Germany was ranked 1st out of 160 countries, the UK was ranked 8th, the US 10th, Japan 12th, France 16th, Italy 21st, Brazil 55th, and the Russian Federation 99th. Germany was the top logistics performer in 2016, ranked first, with the maximum relative LPI score of 100. The UK had a relative LPI score of 95.16 (as a percent of the highest performer, Germany), the US 92.75, Japan 92.08, France 89.93, Italy 85.41, Brazil 64.72, and the Russian Federation 48.69. Brazil was worse than Germany, the UK, the US, Japan, France, and Italy but better than the Russian Federation, in each one of the abovementioned six core components captured by the LPI survey.

Table 13.9 and Fig. 13.1 capture the deterioration and improvement in Brazil's international rank of trade logistics performance from 2007 to 2016.

During the period 2007–2016, 40–64 countries exhibited better ranking than Brazil in international trade logistics performance and 89–114 countries exhibited worse ranking than Brazil. Brazil's ranking in international trade logistics performance during the 2007–2016 decade was above the median ranking among the sample of 150–160 countries considered for rating by the World Bank. Less than half of these countries had better logistics performance and more than half had worse logistics performance.

Table 13.8 International rankings of trade logistics performance of Brazil and the G7 advanced economies

	Country	Germany	UK	USA	Japan	France	Italy	Brazil	Russia
overall LPI score	score	4.23	4.07	3.99	3.97	3.90	3.76	3.09	2.57
overall LPI rank	rank	**1**	**8**	**10**	**12**	**16**	**21**	**55**	**99**
	% of highest performer	100.00	95.16	92.75	92.08	89.93	85.41	64.72	48.69
Customs	score	4.12	3.98	3.75	3.85	3.71	3.45	2.76	2.01
	rank	**2**	**5**	**16**	**11**	**17**	**27**	**62**	**141**
Infrastructure	score	4.44	4.21	4.15	4.10	4.01	3.79	3.11	2.43
	rank	**1**	**5**	**8**	**11**	**15**	**19**	**47**	**94**
International shipments	score	3.86	3.77	3.65	3.69	3.64	3.65	2.90	2.45
	rank	**8**	**11**	**19**	**13**	**20**	**17**	**72**	**115**
Logistics quality and competence	score	4.28	4.05	4.01	3.99	3.82	3.77	3.12	2.76
	rank	**1**	**7**	**8**	**12**	**19**	**21**	**50**	**72**
Tracking and tracing	score	4.27	4.13	4.20	4.03	4.02	3.86	3.28	2.62
	rank	**3**	**7**	**5**	**13**	**15**	**20**	**45**	**90**
Time lines	score	4.45	4.33	4.25	4.21	4.25	4.03	3.39	3.15
	rank	**2**	**8**	**11**	**15**	**13**	**22**	**66**	**87**

Source: Jean-François Arvis et al. (2016). https://wb-lpi-media.s3.amazonaws.com/LPI_Report_2016.pdf

Table 13.9 Trend in Brazil's international rank of trade logistics performance compared to the total number of countries considered each year

Year	2007	2010	2012	2014	2016
Brazil's overall LPI rank	61	41	45	65	55
Total number of countries in the sample	150	155	155	160	160
Countries with better logistics performance	60	40	44	64	54
Countries with worse logistics performance	89	114	110	95	105

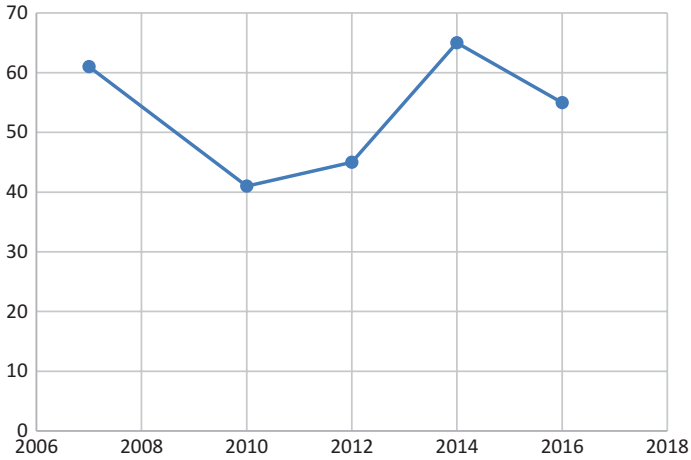

Fig. 13.1 Trend in Brazil's international ranking of trade logistics performance. (Source: Table 13.9)

13.4 International Connectedness of Brazil Compared to that of the BRIC and G7 Countries

As shown in Table 13.6, Brazil maintains relatively limited ties to the rest of the world beyond its resource exports. In this section, we will re-examine the structure of Brazil's connectedness and economic integration with the rest of the world.

International inflows and outflows should count not only goods, services, and finance but also people (labor mobility and immigration), along with the data and communication flows, because all of them are creating

bonds of connectedness among countries and affect the international economic integration and income growth of nations. The McKinsey Global Institute (MGI) has produced reports on indices of connectedness for 195 countries around the world (Manyika 2014). Table 13.10 shows rankings of the MGI international connectedness index for Brazil as it compares to the emerging economies of the BRIC and three Latin America countries.

The MGI connectedness index in Table 13.10 indicates that, among the emerging markets of the BRIC countries, Brazil is less internationally connected than the rest. Among 131 countries in the 2016 sample, China is ranked 7th, the Russian Federation is ranked 14th, India 30th, and Brazil 44th. Given its large population, growing consumer class, and endowments of natural resources, Brazil is surprisingly unconnected to the global economy. While the country ranks relatively high in financial flows, at 14th, it is placed 41st on flows of goods, 38th on flows of services, 30th on data and communication flows, and only 125th on people flows.

Brazil's high participation in global financial flows is due to foreign direct investment (FDI) and cross-border loans and deposits. The very low ranking on people flows is due to language barriers. Brazil has a low proficiency in the English language[4] and its people speak Portuguese among Spanish-speaking neighbors. With the exception of the Russian Federation, the flow of people and data through the borders of Brazil, China and India have been worse than the flow of goods, services, and financial assets.

For Brazil, *flow intensity*, the value of flows relative to the size of the economy (GDP), is the lowest among the BRIC countries and two of the three Latin American countries, Mexico and Chile. China has a flow intensity of 63 percent of its GDP, India 64, the Russian Federation 57, and Brazil and Argentina 37 each. The flow intensity of goods, services, finance, people, and data for Mexico is 80 percent of its GDP, and for Chile it is 92. The flow intensity in Mexico and Chile is considerably higher than the one in all BRIC countries.

Table 13.11 reports rankings of the MGI international connectedness index for Brazil as it compares to the G7 countries.

The MGI Connectedness Index in Table 13.11 indicates that, among the G7 countries, Brazil is less internationally connected than all of them, as expected. The US is ranked 3rd (among 131 countries), Germany is ranked 4th, the UK 6th, France 8th, the Russian Federation 14th, Italy 17th, Japan 24th, and Brazil 44th.

Table 13.10 The MGI international connectedness index rankings of Brazil, the BRIC, and Latin American emerging economies in 2014

Country	Rank	Score	Goods	Services	Finance	People	Data	Flow value (in bil. USD)	Flow intensity (% of GDP)
China	7	34.2	4	16	4	82	38	6,480	63
Russia	14	16.1	21	25	18	5	25	1,059	57
India	30	8.5	24	10	35	58	70	1,316	64
Brazil	44	4.5	41	38	14	125	30	869	37
Mexico	21	10.7	14	63	34	18	41	1,022	80
Chile	45	4.1	45	58	16	102	27	239	92
Argentina	72	2.3	64	68	63	60	32	198	37

Source: Manyika et al. (2014)

Note: Flows value represents total goods, services, and financial inflows and outflows. Flow intensity represents the total value of goods, services, and financial flows as a share of the country's GDP. https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/global-flows-in-a-digital-age

Table 13.11 The MGI international connectedness index rankings of Brazil and the G7 advanced economies

Country	Rank	Score	Goods	Services	Finance	People	Data	Flow value (in bil. USD)	Flow intensity (% of GDP)
US	3	52.7	7	7	3	1	7	6,832	39
Germany	4	51.9	2	4	8	3	2	3,798	99
UK	6	40.8	13	5	5	6	3	2,336	79
France	8	30.1	11	8	9	7	4	2,262	80
Russia	14	16.1	21	25	18	5	25	1,059	57
Italy	17	13,4	17	18	24	16	19	1,587	74
Japan	24	10.5	15	20	12	8	20	2,498	54
Brazil	44	4.5	41	38	14	125	30	869	37

Source: Manyika et al. (2014)

Note: Flows value represents total goods, services, and financial inflows and outflows. Flow intensity represents the total value of goods, services, and financial flows as a share of the country's GDP. https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/global-flows-in-a-digital-age

Among the world's large economies, Germany has a flow intensity of 99 percent of its GDP, France 80 percent, the UK 79 percent, Italy 74 percent, the Russian Federation 57 percent, and Japan 54 percent. The lowest flow intensity belongs to the largest economy of the world, the US; it is 39 percent of GDP and is similar to that of Brazil, which is 37.

13.5 Brazil's Foreign Direct Investment Compared to that of the BRIC and G7 countries

FDI represents a characteristic form of international integration. FDI refers to direct investment equity flows in an economy. It is the sum of equity capital, reinvestment of earnings, and other capital. Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy. Ownership of 10 percent or more of the ordinary shares of voting stock is the criterion for determining the existence of a direct investment relationship. Table 13.12 shows the ranking of net outflows of investment from the reporting BRIC economy to the rest of the world and is divided by GDP. Table 13.12 also shows the ranking of net inflows of investment from the rest of the world to the reporting BRIC economy and is divided by GDP (see also: https://www.indexmundi.com/facts/indicators/BM.KLT.DINV.WD.GD.ZS/rankings)

In 2016, Brazil had more FDI net inflows (4.38 percent of GDP) than FDI net outflows (0.71 percent of GDP). A similar pattern of FDI net inflows and outflows was experienced by India (with 1.96 percent of GDP net inflows and 0.22 percent of net outflows) and the Russian Federation (with 2.54 percent of GDP net inflows and 1.74 percent of net outflows). That was in contrast to the experience of China where FDI net inflows (1.52 percent of GDP) were lower than FDI net outflows (1.94 percent of GDP). All BRIC countries, with the exception of China, were net recipients of FDI. Table 13.13 compares Brazil with the G7 countries.

Table 13.12 Foreign direct investment, net outflows, and inflows (% of GDP) of Brazil and BRIC emerging economies international ranking

FDI Net outflows			FDI NET inflows		
Country	Rank among 176 countries	Value (% of GDP)	Country	Rank among 187 countries	Value (% of GDP)
China	38	1.94	Brazil	64	4.35
Russian	45	1.74	Russia	100	2.54
Brazil	65	0.71	India	112	1.96
India	98	0.22	China	123	1.52

Source: International Monetary Fund, Balance of Payments Manual, sixth edition

Table 13.13 Foreign direct investment, net outflows, and inflows (% of GDP) of Brazil and G7 advanced economies international ranking

FDI Net outflows			FDI NET inflows		
Country	Rank among 176 countries	Value (% of GDP)	Country	Rank among 187 countries	Value (% of GDP)
Japan	24	3.43	UK	20	11.07
France	32	2.61	Brazil	64	4.35
Germany	36	2.19	US	99	2.57
UK	42	1.88	Russian	100	2.54
Russian	45	1.74	Germany	124	1.51
US	47	1.67	France	127	1.44
Italy	62	0.82	Italy	140	0.99
Brazil	65	0.71	Japan	153	0.71

Source: International Monetary Fund, Balance of Payments Manual, sixth edition
https://www.indexmundi.com/facts/indicators/BM.KLT.DINV.WD.GD.ZS/rankings

Brazil, the US, the UK, and Italy experienced a higher value of FDI net inflows, as a percent of their GDP, than net outflows in 2016. For Brazil, FDI net inflows were 4.35 percent of GDP and FDI net outflows 0.71 percent. For the US, FDI net inflows were 2.57 percent of GDP and FDI net outflows 1.67 percent, for the UK, FDI net inflows were 11.07 percent of GDP and net outflows 1.88 percent, while for Italy, FDI net inflows were 0.99 percent of GDP and net outflows 0.82 percent. Brazil, the US, the UK, and Italy were net recipients of FDI in 2016.

This pattern of FDI was in contrast to the one experienced in 2016 by Japan, France, and Germany, which had a lower value of FDI net inflows as a percent of their GDP than net outflows. Japan had FDI net inflows amounting to 0.71 percent of GDP and net outflows of 3.43 percent,

France had FDI net inflows amounting to 1.44 percent of GDP and net outflows of 2.61 percent, while Germany had FDI net inflows amounting to 1.51 percent of GDP and net outflows of 2.19 percent. Japan, France, and Germany were net suppliers of FDI in 2016.

13.6 Ease of Doing Business in Brazil Compared to the BRIC, Latin American, and G7 Countries

FDI is affected by the obstacles foreign firms are facing in doing business in other countries. A project of the World Bank on "Doing Business" provides objective measures of business regulations and their enforcement across 190 economies and selected cities at the subnational and regional levels.

Economies are ranked by the World Bank on their ease of doing business from 1 to 190. A high ranking means that the regulatory environment is more conducive (favorable) to the starting and operation of a local firm. The rankings are determined by sorting the aggregate "Distance to Frontier" (DTF) scores on ten topics, each consisting of several indicators, giving equal weight to each topic. These measures of the World Bank for Brazil are listed in Table 13.14 and are compared with the BRIC and Latin American countries. The rankings for all economies listed in Table 13.14 are benchmarked to June 2017 (see also: http://www.doingbusiness.org/data/distance-to-frontier).

It is more difficult to start business in Brazil than in any of the other BRIC countries, in Argentina, Mexico, or Chile. Table 13.15 reveals that it takes 79 men-days in Brazil to start a business but only 6 in Chile, 8 in Mexico, and 24 in Argentina. In the Russian Federation, it takes 10 men-days, 23 in China, and 30 in India. It is also more difficult to deal with construction permits in Brazil (434 days) than in Mexico (82 days), in India (144 days), in Russia (239 days), or in China (247 days). Getting credit is again more difficult in Brazil (ranks 105 among 190 countries, with DTF 45 out of 100) than in Mexico (rank 6, DTF 90), in Russia and in India (rank 27, DTF 75), in China (rank 68, DTF 60), in

Table 13.14 Brazil, BRIC, and Latin America economies ranking on ease of doing business

		Brazil	Russia	India	China	Argentina	Chile	Mexico
Starting a Business	Time (days)	79	10	30	23	24	6	8
	DTF	22	90	71	77	76	95	92
	Ease of starting a business (DTF)	65	93	75	85	75	90	86
	Ease of Starting RANK	176	28	156	93	157	65	90
Dealing with Construction Permits	Time (days)	434	239	144	247	347	133	82
	DTF	–	39	66	36	7	69	84
	Ease of dealing with construction permits (DTF)	50	65	39	47	49	80	68
	Ease of Construction RANK	170	115	181	172	171	15	87
Getting Electricity	Time (days)	64	83	46	143	92	43	100
	DTF	80	72	88	46	68	89	64
	Ease of getting electricity (DTF)	82	93	85	69	70	82	71
	Ease of getting electricity RANK	45	10	29	98	95	44	92
Registering Property	Time (days)	31	13	53	19	52	29	39
	DTF	85	94	75	91	76	87	82
	Ease of registering property (DTF)	53	89	47	76	57	71	61
	Ease of Property RANK	131	12	154	41	117	61	99
Getting Credit	Ease of getting credit (DTF)	45	75	75	60	55	50	90
	Ease of Credit RANK	105	29	29	68	77	90	6
Protecting Minority Investors	Strength of minority investors protection index (DTF)	63	62	80	48	63	60	58
	Ease of Protecting Minority Investors RANK	43	51	4	119	43	57	62
Paying Taxes	Total tax and contribution rate (% of profit)	68	48	55	67	106	33	52
	Ease of paying taxes (DTF)	33	79	66	63	49	76	67
	Ease of Taxes RANK	184	52	119	130	169	72	115

Trading Across Borders	Time to export: Border compliance (hours)	49	72	106	26	21	60	20
	DTF	70	55	34	84	87	63	88
	Time to export: Documentary compliance (hours)	12	25	38	21	30	24	8
	DTF	93	86	78	88	83	86	96
	Cost to export: Border compliance (US$)	959	665	382	484	150	290	400
	DTF	10	37	64	54	86	73	62
	Cost to export: Documentary compliance (USD)	226	92	92	85	60	50	60
	DTF	43	77	77	79	85	88	85
	Time to import: Border compliance (hours)	63	39	26	92	60	54	44
	DTF	78	87	6	67	79	81	85
	Time to import: Documentary compliance (hours)	48	43	61	66	192	36	18
	DTF	80	83	75	73	20	85	93
	Cost to import: Border compliance (US$)	970	588	543	745	1200	290	450
	DTF	19	51	55	38	–	76	63
	Cost to import: Documentary compliance (US$)	107	153	135	171	120	50	100
	DTF	85	78	81	76	83	93	86
	Ease of trading across borders (DTF)	60	69	59	70	65	81	82
	Ease of Trading RANK	139	100	146	97	116	68	63

(*continued*)

Table 13.14 (continued)

		Brazil	Russia	India	China	Argentina	Chile	Mexico
Enforcing Contracts	Time (days)	731	337	1445	496	995	480	341
	DTF	50	82	–	69	28	70	82
	Ease of enforcing contracts (DTF)	66	72	41	78	56	63	67
	Ease of Contracts RANK	47	18	164	5	102	56	41
Resolving Insolvency	Recovery rate (cents on the dollar)	13	41	26	37	21	41	68
	DTF	14	44	28	40	23	44	73
	Ease of resolving insolvency (DTF)	47	58	41	56	41	59	72
	Ease of Resolving Insolvency RANK	80	54	103	56	101	52	31
Ease of Doing Business	Current Data RANK	125	35	100	78	117	55	49
	Overall distance to frontier (DTF) score as of current data (0–100)	56	76	61	65	58	71	72

Source: http://www.doingbusiness.org/Rankings

Note: The "Doing Business" reports of the World Bank present results for two aggregate measures: the *distance to frontier* (DTF) *score* and the *ease of doing business ranking*, which is based on the DTF score. The ease of doing business ranking compares economies with one another; the DTF score benchmarks economies with respect to regulatory best practice, showing the absolute distance to the best performance on each Doing Business indicator. When compared across years, the DTF score shows how much the regulatory environment for local entrepreneurs in an economy has changed over time in absolute terms, while the ease of doing business ranking can show only how much the regulatory environment has changed relative to that in other economies (see: http://www.doingbusiness.org/~/media/WBG/DoingBusiness/Documents/Annual-Reports/English/DB18-Chapters/DB18-DTF-and-DBRankings.pdf)

Table 13.15 Brazil and G7 advanced economies: Ranking on easiness of doing business

		Brazil	France	Germany	Italy	Japan	Russia	UK	US
Starting a Business	Time (days)	79	4	11	7	12	10	5	6
	DTF	22	97	90	94	88	90	96	95
	Ease of starting a business (DTF)	65	93	83	89	84	93	95	91
	Ease of Starting RANK	176	25	113	66	106	28	14	49
Dealing with Construction Permits	Time (days)	434	183	126	228	197	239	86	81
	DTF	–	55	71	42	51	39	83	84
	Ease of dealing with construction permits (DTF)	50	79	78	67	73	65	80	76
	Ease of Construction RANK	170	18	24	96	50	115	14	36
Getting Electricity	Time (days)	64	71	28	82	98	83	79	90
	DTF	80	77	96	72	65	72	73	69
	Ease of getting electricity (DTF)	82	86	99	85	90	93	93	82
	Ease of getting electricity RANK	45	26	5	28	17	10	9	49
Registering Property	Time (days)	31	64	52	16	13	13	22	15
	DTF	85	70	76	93	94	94	90	93
	Ease of registering property (DTF)	53	61	66	82	74	89	75	77
	Ease of Property RANK	131	100	77	23	52	12	47	37
Getting Credit	Ease of getting credit (DTF)	45	50	70	45	55	75	75	95
	Ease of Credit RANK	105	90	42	105	77	29	29	2
Protecting Minority Investors	Strength of minority investors protection index (DTF)	63	67	58	58	58	62	75	65
	Ease of Protecting Minority Investors RANK	43	33	62	62	62	51	10	42
Paying Taxes	Total tax and contribution rate (% of profit)	68	62	49	48	47	48	31	44
	Ease of paying taxes (DTF)	33	79	82	68	77	79	87	84
	Ease of Taxes RANK	184	54	41	112	68	52	23	36

(*continued*)

Table 13.15 (continued)

		Brazil	France	Germany	Italy	Japan	Russia	UK	US
Trading Across Borders	Time to export: Border compliance (hours)	49	–	36	–	23	72	24	2
	DTF	70	100	78	100	86	55	86	100
	Time to export: Documentary compliance (hours)	12	1	1	1	2	25	4	2
	DTF	93	100	100	100	99	86	98	100
	Cost to export: Border compliance (US$)	959	–	345	–	265	665	280	175
	DTF	10	100	67	100	75	37	74	83
	Cost to export: Documentary compliance (USD)	226	–	45	–	54	92	25	60
	DTF	43	100	89	100	87	77	94	85
	Time to import: Border compliance (hours)	63	–	–	–	40	39	3	2
	DTF	78	100	100	100	86	87	99	100
	Time to import: Documentary compliance (hours)	48	1	1	1	3	43	2	8
	DTF	80	100	100	100	99	83	100	97
	Cost to import: Border compliance (US$)	970	–	–	–	299	588	–	175
	DTF	19	100	100	100	75	51	100	85
	Cost to import: Documentary compliance (US$)	107	–	–	–	107	153	–	100
	DTF	85	100	100	100	85	78	100	86
	Ease of trading across borders (DTF)	60	100	92	100	87	69	94	92
	Ease of Trading RANK	139	1	39	1	51	100	28	36

Enforcing Contracts	Time (days)	731	395	499	#####	360	337	437	420
	DTF	50	77	69	18	80	82	74	75
	Ease of enforcing contracts (DTF)	66	73	71	55	65	72	69	73
	Ease of Contracts RANK	47	15	22	108	51	18	31	16
Resolving Insolvency	Recovery rate (cents on the dollar)	13	73	81	65	92	41	85	82
	DTF	14	79	87	70	99	44	92	88
	Ease of resolving insolvency (DTF)	47	74	90	77	93	58	80	91
	Ease of Resolving Insolvency RANK	80	28	4	24	1	54	14	3
Ease of Doing Business	Current Data RANK	125	31	20	46	34	35	7	6
	Overall distance to frontier (DTF) score as of current data (0–100)	56	76	79	73	76	76	82	83

Source: http://www.doingbusiness.org/Rankings

Note: Economies are ranked on their ease of doing business, from 1 to 190. The rankings for all economies are benchmarked to June 2017

Argentina (rank 77, DTF 55), and in Chile (rank 90, DTF 50). Paying taxes in Brazil is also more difficult than in any one of the other countries as shown in Table 13.15. In getting electricity, registering property, protecting minority investors, and trading across borders, Brazil does better than some of the countries in Table 13.15 and worse than others. Overall, though, the ease of doing business in Brazil is worse than in any one of the other countries. Brazil is ranked 125th out of 190 countries, the Russian Federation is ranked 35th, Mexico 49th, Chile 55th, China 78th, India 100th, and Argentina 117th.

Measures on ease of doing business for Brazil are also listed in Table 13.15 and are compared with those of the G7 countries.

A considerable amount of FDI inflows in Brazil are expected to arrive from the G7 advanced countries. It is more time-consuming, though, to start business in Brazil than in any one of the G7 advanced economies. Table 13.15 reveals that it takes 79 men-days in Brazil in starting a business but only 4 in France, 5 in the UK, 6 in the US, 7 in Italy, 10 in the Russian Federation, 11 in Germany, and 12 in Japan. It is also more difficult in dealing with construction permits in Brazil (434 days) than in the US (81 days), the UK (86 days), Germany (126 days), Japan (197 days), Italy (228 days), or the Russian Federation (239 days). Getting credit is again more difficult in Brazil (ranks 105 among 190 countries, with DTF 45 out of 100) than in Mexico (rank 6 and DTF 90), Russia and India (rank 27 and DTF 75), China (rank 68 and DTF 60), Argentina (rank 77 and DTF 55), and Chile (rank 90 and DTF 50). Paying taxes in Brazil is also more difficult than in any one of the other countries as shown in Table 13.15. Getting electricity, though, is easier in Brazil (64 days) than in France (77 days), the UK (79 days), Italy (82 days), the Russian Federation (83 days), the US (90 days), and Japan (98 days). In getting credit, registering property, protecting minority investors, and trading across borders, Brazil does better than some of the countries as shown in Table 13.15 and worse than others. Overall, though, the easiness in doing business in Brazil is worse than in any one of the advanced economies. Brazil is ranked 125th out of 190 countries, the US United States 6th, the UK 7th, Germany 20th, France 31st, Japan 34th, the Russian Federation is ranked 35th, and Italy 46th.

A discussion of alternative metrics for assessing the dynamics and the degree of international integration and globalization of a national economy can be found, among other academic sources, in Caselli (2012) and Lombaerde and Iapadre (2008) and is not be discussed here.

13.7 Implications from an International Economic Integration

Previous sections offered descriptive statistics to present Brazil's standing in terms of international economic integration as it compares to the standing of emerging and advanced economies. In the following sections, we will discuss issues that shed light to the implications of international economic integration and how those implications apply to Brazil.

13.7.1 Exploitable Economic Dependencies

All types of economic integration establish value supply chains that create *exploitable economic dependencies*, which make cheaper and more modern inputs available to the engaged countries and enable companies to absorb more of the world's rapidly expanding flows of innovation, technology, research, and ideas. It supports a business environment under which production is based on the principles of comparative advantage, economies of scale, and specialization. As a result, international economic integration increases productivity, competitiveness, and income growth[5] for the engaged countries.

National economies can benefit from their exploitation of benefits from their supply of exports, and they can also benefit from their exploitation of their demand for imports. Their ability to extract maximum benefits from these exploitable economic dependencies depend on the elasticities of demand and supply of the products and services in their international trade list; on their economic, political, and market power; and on the role of government, public servants, elites, and businessmen in their country and in the countries with which they trade.

13.8 Process of International Integration

We summarize two views on exploiting economic dependencies in the process of international integration: the view of *unrestricted trade with liberal exploitable economic dependency* and the view of *restricted trade in an economic interdependence with reciprocity and justice*. The objective is to use them as a point of reference in understanding Brazil's standing on those international integration policy views. A conscientious departure, for example, from unrestricted international trade and liberal economic dependencies, and the country's reliance on the principle of protected trade with reciprocity and justice, have important implications for Brazil's rate, structure, and speed of international economic integration.

The view of exploitable dependency, here, springs from the *dependency theory*[6] of economic development introduced in the economics literature in the late 1950s under the guidance of the Director of the United Nations Economic Commission for Latin America, Raul Prebisch.[7] This view holds[8] that national economic interests[9] can encourage developing countries to accept and even seek a dependency of their economies upon the support of more advanced nations for technology and capital to create domestic employment and promote national economic growth, in exchange for their agricultural and primary products. This acceptance of dependency by developing countries can frequently be a response to the interest of industrialized and advanced nations to develop a dependency of their own economies on the support from less advanced nations for cheap labor and natural resources. This mutual exploitable dependency between rich (center) and poor (periphery) nations encourages the creation of international economic integration. International integration of this type, though, suffers from lack of long-term sustainability. According to the dependency theory of economic development, it cannot deliver to the partner countries equitable distribution of benefits from the exploitation of their mutual dependency.

Significantly different country elasticities of demand and supply for industrial products imported by the developing countries and different country elasticities of demand and supply for cheap labor and natural resources imported by the advanced economies will establish and impose

an unequal distribution of market power between importing and exporting countries. Unequal distribution in the market power imposes an unequal ability to create a higher producer surplus for their exports and extract a higher consumer surplus from their imports, perpetuating an unequal distribution of benefits from their mutual exploitable dependency.

Disparity in a country's ability to extract comparable benefits from trade-partner countries is linked not only to disparities in market power but also to disparities in economic[10] and political power. Such disparities would lead to *asymmetric integration*. As Ferraro (2008) explains, the poor countries could be coercively integrated into the international economic system only as producers of raw materials or to serve as sources of cheap labor and will be denied the opportunity to market their resources in any way that competed with dominant countries.

This type of international integration makes periphery countries worst off. Primary commodities have lower "value added" and are sold by periphery countries at lower prices than manufactured products with higher "value added" and are sold at higher market prices by the industrialized countries. As a result, the "dependency theory" predicts that the periphery countries would never be earning enough foreign exchange from their export earnings to pay for their imports. They will suffer from chronic trade deficits, devaluations of their national currency, and perennial international debt. This type of international economic integration is not sustainable.

A theoretical solution recommended *import substitution* by producing domestically the manufactured commodities developing countries import. Import substitution would enable them to save their foreign exchange reserves from the sale of their primary products abroad and use those foreign exchange reserves to finance domestic productive investment projects. Empirically, the import substitution solution is not workable either, for most of the periphery countries, because the size of their domestic markets cannot support adequate economies of scale to produce substitutes for their imports of manufactured commodities at competitive world prices.

The diversion of resources over time is maintained by the power of dominant states along with the power of public officials and the elites in the dependent states.[11] The propensity of public officials in poor countries

to enrich themselves from the administrative power they possess could make them vulnerable to bribes and adopt external influences on national development policies, which create asymmetric distribution of benefits for their countries from an exploitable dependency (Sunket 1969).

Asymmetric distribution in the market power among trade partners would be an obstacle to sustainable international integration. Resources flowing from a *periphery* of poor and underdeveloped countries to a *core* of wealthy nations, enriching the latter at the expense of the former, would create incentives among the periphery countries to break their trade relationships with the dominant countries. This could reduce the volume of trade and become an obstacle to a sustainable integration of their economies.

The elites of the developing periphery countries are another group that influences a policy of unrestricted trade in an international integration process. Sometimes, the elites have incentives to maintain a dependent relationship because their own private interests coincide with the interests of the dominant states. These elites are typically trained in the dominant states, they share similar values and culture with the elites in dominant states, and they sincerely believe that the key to economic development that will create jobs and income for the poor of their country lies in trade liberalization that favors the dominant states, promotes asymmetric dependency, and ultimately hinders sustainable integration.

As a result, a liberal exploitable economic dependency view of international economic integration creates a reaction, in the long run, and a deliberate rational choice of departure from unrestricted trade. Policymakers might see some virtues in free trade, but they will assign higher value to the principle of self-reliance and the adoption of an *inward-looking* approach to development with an increased role for the state in terms of imposing barriers to trade, making inward investment difficult, and promoting nationalization of key industries. Adoption of an inward-looking policy approach has important implications for a country's rate, structure, and speed of international economic integration.

In today's global economic environment, we are frequently concerned with the sustainability of the exploitable economic dependencies among emerging and advanced economies, or even among advanced economies

themselves. Unrestricted trade could enable some emerging or advanced economies to benefit earlier and by a larger amount than their trade partners could from their exploitable dependencies. When some countries become richer at a faster pace and by a significantly larger amount than their trade partners, they create pressure for protectionism to their trade partners, even if those trade partners were as prosperous and powerful as the US in 2018.

Trade partners competing on who will get rich first and by a larger amount could change the process of international economic integration from one based on unrestricted trade with liberal exploitable economic dependency to one based on restricted trade in an economic interdependence with reciprocity and justice.

13.9 Asymmetric Exploitable Dependencies and Pressure on the Intensive Margins of Integration

Competition among trade partners to maximize benefits from their exploitable dependencies creates a destructive friction for the intensive margin of their trade relationships. As a result, although international integration has been a great transformative force for many national economies, its future is uncertain and may be reversible. In this section, we will discuss an historic event that took place within the environment of international economic integration in which Brazil was operating.

Table 13.5 indicates that the US was Brazil's largest import partner in 2016, and China was its largest export partner. The US is the largest economy in the world and a champion of free trade, with no government interference, and liberal exploitable economic dependency in the process of international economic integration. China is the second largest economy in the world and is a communist country "with Chinese characteristics". The Chinese government is actively protecting and cultivating their own internal market, while restricting foreign companies through tariffs, taxes, regulations, licenses, and forced joint ventures, enabling local firms to benefit from Western technology transfer, get access to intellectual property of foreign firms, and exploit Western innovation commercially.

In 2017, US exported 130.4 billion USD worth of goods to China and imported 505.6 billion USD worth of merchandise. As a result, the US trade deficit in goods with China reached a record high of 375.2 billion USD.

The US Trump administration felt that the Chinese behavior put the future of the US economy at risk and decided to get China to open up their markets to "free and fair trade". According to the US media, it had even considered drafting US legislation that would enable the US to abandon key disciplines agreed at the World Trade Organization and instead adopt a US *Fair and Reciprocal Tariff Act*.[12]

On August 18, 2017, US Trade Representative Robert Lighthizer initiated an investigation into certain acts, policies, and practices of the Chinese government related to technology transfer, intellectual property, and innovation. On April 6, 2018, Mr. Lighthizer announced that the acts, policies, and practices of the Chinese government covered in the investigation were unreasonable or discriminatory and were imposing a burden or restrictions on the US commerce. In light of the estimated harm to the US economy and in order to obtain elimination of China's harmful acts, policies, and practices, a 25 percent ad valorem duty was proposed and announced on Thursday, June 15, 2018, on products from China with an annual trade value of approximately 50 billion USD.

The Chinese government, instead of addressing the US concerns regarding the unfair practices found in the investigation, responded on Friday, June 16, 2018, by imposing retaliatory equivalent tariffs of 25 percent on all US goods with a value of 50 billion USD. On Monday, June 18, 2018, the US president issued a statement directing Mr. Lighthizer to identify 200 billion USD worth of Chinese goods for additional tariffs at a rate of 10 percent. These tariffs were scheduled to go into effect if China refused to change its practices or if it insisted on going forward with the new tariffs on US products that it had recently announced.[13]

On Friday, July 6, 2018, the US began collecting a 25 percent tariff on 818 Chinese goods, ranging from aircraft and chicken incubators to industrial magnates. China exported 34 billion USD worth of newly tariff-eligible goods to the US in 2017.[14]

In 2017, the US also felt that unrestricted trade with liberal exploitable economic dependencies with the advanced economies of Canada and the

European Union (EU), along with the emerging economy of Mexico, its North American Free Trade Agreement (NAFTA) partner, were not serving the US national economic interests well. Instead, the intensive margin of their exploitable dependency (the number and magnitude of traded commodities with those economies) had to be restricted to prevent their destructive impact on the US economy.

In 2018, the US started a trade confrontation with its allies and major trade partners: Canada (with a 17.6 billion USD trade deficit in 2017), Mexico (with a 71 billion USD deficit), and the EU (with a 151.36 billion USD trade deficit in 2017), by imposing a 25 percent tariff on their steel exports to the US and a 10 percent tariff on their aluminum exports. Approximately half of US steel imports was coming from these countries. Those nations also retaliated similar to China. Canada imposed a 25 percent tariff on US steel and iron and 10 percent on consumer products imported from the US Canada imposed tariffs on 12.6 billion USD worth of US goods, which became effective on Sunday, July 1, 2018. Most of Mexico's retaliatory tariffs were between 15 percent and 25 percent, imposed mainly on US agricultural and steel products.

The US protectionism and its restrictive policy on international trade was accused by the Chinese state media on Friday, June 22, 2018, as being self-defeating and a "symptom of paranoid delusions" that must not distract China from its path to modernization. For the Trump administration, though, it was the free and unprotected trade with China that was self-defeating and a "symptom of paranoid delusions" and was distracting the US from its path to higher prosperity and helping China to become richer at a faster pace from its unrestricted trade with the US.

By trying to impose on China, Mexico, Canada, and the EU a fair trade with reciprocity and justice, the US government was adopting and defending the view that a free trade with a liberal exploitable economic dependency could make a country, even as big and powerful as the US, vulnerable to unfair and unacceptable exploitation by its trade partners and unsustainable in the long run. Sustainable international economic integration must be based on the principles of economic interdependence with trade reciprocity and justice, even for the US. This 2018 US trade policy was not a new idea. Brazil had already adopted such a policy 15 years earlier in 2003.

13.10 Brazil's Experience with the Process of International Integration

Brazil's recent experience with the process of international economic integration underwent two stages. The first stage, under the presidency of Fernando Henrique Cardoso (1995–2002), took the form of liberal exploitable economic dependency, which usually results in asymmetric international economic integration, while the second stage, initiated by the presidency of Luiz Inacio Lula da Silva (2003–2010), took the form of economic interdependence with reciprocity and justice. The second stage could result into a lower intensive margin of trade associated with a slower and shallower international economic integration.

As we show in Table 13.2, Brazil ranks first in terms of the number of trade partners (in terms of extensive margin of international economic integration), but it ranks last in terms of the number of traded products (in terms of intensive margin of international economic integration) among the BRIC countries. Brazil is slightly better integrated with the world economy than China in terms of extensive margins (Brazil had seven more trade partners than China) but significantly worse integrated with the world economy than China in terms of intensive margins (Brazil had 507 traded products fewer than China). Brazil's international economic integration is shallower than that of all the BRIC countries in terms of intensive margins.

The first experience of international economic integration was based on unilateral opening of Brazil's domestic consumers market, sale of assets of Brazilian companies, foreign trade deficit, foreign indebtedness, submission to consensus, and advice from centers of power controlled by its trade partners. Dominated by the advanced economies, Brazil's obedience to the rules of global governance established by the rich nations to their own benefit resulted in sacrificing Brazil's relations with emerging countries in favor of the advanced economies.[15]

This economic opening, though, came with a number of favorable side effects. It resulted in the modernization of Brazil's industrial plants and made the Brazilian economy more competitive in the long run. The global implications from this experience were asymmetric distribution of benefits. Brazil's adverse impact from this experience was a loss of power on the inter-

national scene, while the benefits were perceived as insignificant and were forgotten. Always the bitterness from a bad quality relationship is remembered long after the sweetness of the benefits from that relationship is forgotten. That bitterness becomes eventually a catalyst for change, as it was also the case with the liberal US trade policy discussed in the previous section.

The second experience was based on bilateral or multilateral opening of Brazil's economy with an intermediate role played by the State as an international negotiator in protecting the national interests of both producers and consumers, the rich and the poor, entrepreneurs and wage earners, promoting free trade that ensures reciprocity of benefits with justice and expanding the business of Brazilian firms abroad through internationalization of Brazilian companies (see Cervo, 2010 for more on this topic).[16] This is exactly what the US Federal Government in Washington also did in 2018. Under the Trump administration, the US government played the role of an international negotiator in protecting the US national interest of US producers, entrepreneurs, and wage earners using tariffs to enforce trade restrictions as a powerful policy instrument.

13.11 Economic Interdependence with Reciprocity and Justice: The G-20 Experience

Reciprocity and justice in multilateral negotiations on mutually exploitable dependencies should be based on rules benefiting all nations that try to integrate in the global economy. Without such rules, an international order of integration remains at the mercy of the more advanced and stronger economies, as appeared to be the case in negotiations at the multilateral organizations of General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO). GATT was established in 1948 with 23-member nations and remained in effect until 1994 with 123 members. The WTO replaced GATT in 1995. Both GATT and the WTO facilitated the international economic integration of many national economies since 1948 by reducing tariffs imposed by national governments and increasing international trade. The average tariff levels in 1947 were 22 percent but were 5 percent by 1999.

An effort by Brazil to support an international order of trade reciprocity and justice, in 2003, led to the creation of the Group of 20, or G-20, in Geneva, before the Cancun Conference of the WTO, in response to an effort by the US and the EU to impose an unfair agreement that left farm subsidies by those countries virtually untouched and offered little or no opening for products of interest to developing countries, while demanding from these countries disproportionate concessions. The G-20 was made up of emerging economies determined to prevent the acceptance of results predetermined by the G7 countries (Germany, Italy, France, the UK, US, Japan, and Russia) at multilateral trade negotiations in places like the WTO. The G7 countries did not yield to the G-20 countries' right to partake in the decision-making power which determined global trade order, demanding from the emerging countries the liberalization of their industrial markets without giving up their farm policies. The G-20, though, had gained sufficient power to ensure reciprocity and justice in the achievement of interests. The WTO no longer accepts prior agreements between rich countries proposed to the assembly as a possible consensus to be imposed from above. The interests of emerging economies are now part of the negotiation dynamics, and the principle of *economic interdependence with reciprocity and justice* in the process of international economic integration has had the support of the G-20 since 2003.

13.12 Brazil's Exploitable Dependency on International Integration

Brazil's economic integration to the world economy can be considered as the outcome of a rational choice of an international trade policy. We look once again at descriptive statistics to investigate Brazil's standing in terms of the dependency of its economy (its GDP) on international trade and how Brazil's dependency on international integration compares to that of the BRIC and the G7 countries.

A country's exploitable dependency on international integration will be measured as the monetary value of trade (exports plus imports) divided by

the country's GDP. A country's dependency on international trade reflects the openness of that country to international integration and globalization.

Table 13.16 and Fig. 13.2 compare Brazil's dependency on international trade to that of the BRIC emerging economies from 2006 to 2016.

Table 13.16 Dependency on trade (Exports plus imports as a % of GDP): Brazil as it compares to the BRIC emerging economies (2006 through 2016)

Year	China's trade (% of GDP)	Russia's trade (% of GDP)	India's trade (% of GDP)	Brazil's trade (% of GDP)
2006	70.99	55.41	46.79	24.98
2007	68.37	52.36	44.91	24.67
2008	62.27	53.93	59.73	26.74
2009	48.42	49.22	44.90	21.41
2010	54.81	50.57	48.74	21.75
2011	54.00	48.85	56.48	22.91
2012	50.79	47.60	58.04	23.90
2013	48.86	47.43	56.81	24.67
2014	47.23	47.90	52.55	23.99
2015	41.60	49.23	44.92	26.16
2016	38.78	46.43	40.52	23.54
Avg.	*53.28*	*49.90*	*50.40*	*24.07*
STD	*10.29*	*2.87*	*6.57*	*1.65*
% Change From 2006 to 2016	*–45.4%*	*–16.2%*	*–13.4%*	*–5.8%*

Source (for Exports & Imports): World Trade Organization: World Trade Statistical Review 2017, Tables A6 (p. 102) & A8 (p. 104), https://www.wto.org/english/res_e/statis_e/wts2017_e/wts17_toc_e.htm

Source (for GDP): World Bank: World Bank Open Data, https://data.worldbank.org

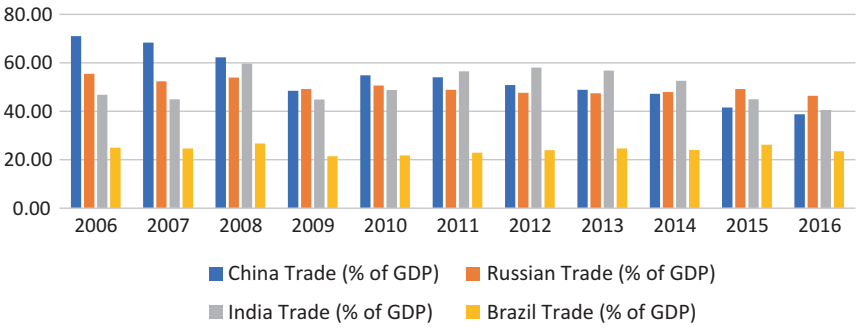

Fig. 13.2 Dependency on trade (as a % of GDP): Brazil and the BRIC emerging economies 2006 through 2016. (Source: Table 13.16)

Table 13.16 and Fig. 13.2 reveal that Brazil's dependency on international trade and its openness to international integration during the period 2006–2016 are approximately half of that of China, Russia, and India (24.07 percent versus 53.28 percent, 49.9 and 50.40, respectively). Brazil's dependency on international trade has also been relatively stable during the ten-year period of 2006–2016 (an average of 24.07 percent of GDP with a low standard deviation of 1.65 percent of GDP), while the dependency of China, India, and Russia on international trade is twice as high as Brazil's (an average of 53.28, 50.40, and 49.90 percent of GDP, respectively), with a higher volatility in China and India (a standard deviation of 10.29 percent and 6.57 percent of GDP, while the trade volatility in Russia is only 2.87 percent of GDP).

In 2006, Brazil had the lowest dependency rate on international integration among the BRIC emerging economies. In 2006, only 24.98 percent of Brazil's GDP depended on international trade compared to China (70.99 percent of GDP), the Russian Federation (55.41 percent), and India (46.79 percent). Ten years later, in 2016, Brazil still had the lowest dependency rate on international integration among the BRIC emerging economies. Only 23.54 percent of Brazil's GDP was coming from international trade compared to China (38.78 percent of GDP), the Russian Federation (46.43 percent), and India (40.52 percent).

In 2016, Brazil's dependency on international integration dropped by 5.8 percent of what it was in 2006 (from 24.98 percent of Brazil's GDP in 2006 to 23.54 percent in 2016), compared to a 45.4 percent drop in China (from 70.99 percent of China's GDP in 2006 to 38.78 percent in 2016), a 16.2 percent drop in the Russian Federation (from 55.41 percent of the Russian GDP in 2006 to 46.43 percent in 2016), and a 13.4 percent drop in India (from 46.79 percent in 2006 to 40.52 percent in 2016).

This drop in each country's international trade (as a percentage of GDP) was mainly in response to the global financial crisis of 2008. In the case of China, though, this drop was very large and systematic every year. By 2016, China reduced the dependency of its economy on international integration by almost half (by 46.43 percent) of what it was ten years earlier. The value of China's trade from 2006 to 2016 was not reduced (although the share of its trade was reduced). In fact, just the opposite occurred. China's international trade was increased, but the value of its

GDP was rising at a faster rate than the value of its trade during that period. As a result, the value of the ratio of trade divided by GDP was falling, and a higher share of China's GDP was derived from the domestic economy. In other words, the dependency of China's economy (GDP) on the domestic market (on consumer, investor and government spending) grew faster from 2006 to 2016 than China's dependency on foreign trade. During this period, the domestic market became more important for the economic growth of China than its international integration. The value of China's domestic market was 29.02 percent of its GDP in 2006 and became 61.22 percent of its GDP by 2016, while the value of Brazil's domestic market was 75.02 percent of its GDP in 2006 and became 76.46 percent of its GDP by 2016.

The implication of this analysis is that Brazil has a higher potential to exploit economic benefits derived from its extensive and intensive margins of international integration than any other BRIC country.

Table 13.17 and Fig. 13.3 reflect the dependency on international trade from 2006 through 2016 in the G7 countries, in comparison to Brazil.

In 2016, Brazil's dependency on international integration dropped by 5.8 percent of what it was in 2006 (from 24.98 percent to 23.54 percent), compared to a 16.2 percent drop in the Russian Federation (from 55.41 percent to 46.43 percent), and a 0.2 percent drop in Japan (from 32.51 percent to 32.45 percent). Germany, France, the UK. Italy, and the US experienced an increase in their dependency of their GDP on international trade by 6.6 percent, 8.2 percent, 5.1 percent, 5.4 percent, and 0.1 percent of their GDP, respectively. Although the international trade of each country (as a percentage of each country's GDP) dropped in 2009, in response to the global financial crisis of 2008, it reached its original level within 2–4 years in most of the advanced economies.

Table 13.17 and Fig. 13.3 reveal that Brazil's dependency on international trade and its openness to international integration during the 2006–2016 period is less than one-third of that of Germany's (24.07 percent vs. 83.75 percent of GDP), less than half of that of France, the UK, Italy, and Russia (24.07 percent vs. 60.08 percent, 58.46 percent, 55.89 percent, and 49.90 percent, respectively), and a little less than that of Japan and the US (24.07 percent vs. 33.70 percent and 28.28 percent of GDP, respectively).

Table 13.17 Brazil's dependency on trade (Exports plus imports as a % of GDP) from 2006 to 2016 as it compares to the G7 advanced economies

Year	Germany trade (% of GDP)	France trade (% of GDP)	UK trade (% of GDP)	Italy trade (% of GDP)	Russian trade (% of GDP)	Japan trade (% of GDP)	US trade (% of GDP)	Brazil trade (% of GDP)
2006	80.39	57.96	56.20	54.81	55.41	32.51	26.38	24.98
2007	82.53	58.37	52.04	56.84	52.36	35.72	27.49	24.67
2008	84.07	59.86	56.84	56.43	53.93	36.91	29.56	26.74
2009	73.52	52.48	55.03	46.94	49.22	26.86	24.34	21.41
2010	81.82	57.31	59.41	53.89	50.57	30.85	27.86	21.75
2011	86.98	61.25	63.77	57.44	48.85	32.32	30.67	22.91
2012	87.38	62.62	62.59	58.06	47.60	32.26	30.58	23.90
2013	85.81	62.06	63.30	57.16	47.43	35.88	30.09	24.67
2014	85.71	62.56	58.26	57.18	47.90	38.20	29.97	23.99
2015	87.27	63.76	56.61	58.32	49.23	36.68	27.68	26.16
2016	85.76	62.69	59.04	57.76	46.43	32.45	26.42	23.54
Avg.	*83.75*	*60.08*	*58.46*	*55.89*	*49.90*	*33.70*	*28.28*	*24.07*
STD	*4.12*	*3.33*	*3.66*	*3.26*	*2.87*	*3.32*	*2.06*	*1.65*
% Change from 2006 to 2016	6.7%	8.2%	5.1%	5.4%	−16.2%	−0.2%	0.1%	−5.8%

Source (for Exports & Imports): World Trade Organization: World Trade Statistical Review 2017, Tables A6 (p. 102) & A8 (p. 104), https://www.wto.org/english/res_e/statis_e/wts2017_e/wts17_toc_e.htm
Source (for GDP): World Bank: World Bank Open Data, https://data.worldbank.org

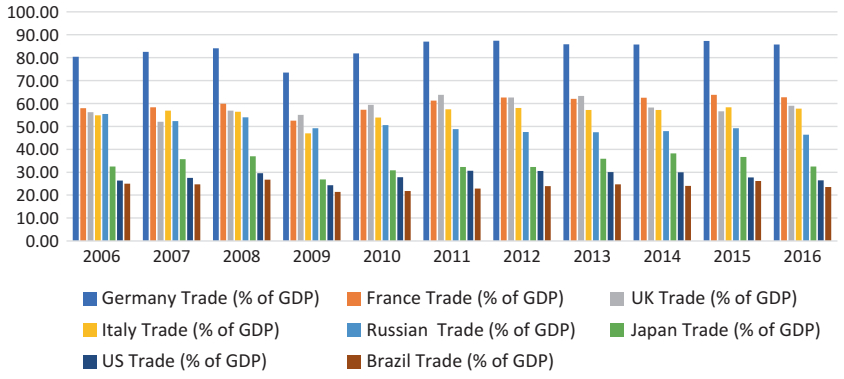

Fig. 13.3 Brazil's dependency on trade (as a % of GDP) from 2000 to 2016 and the G7 advanced economies. (Source: Table 13.17)

Brazil's dependency on international trade (24.07 percent of GDP) appears to be similar to that of the US (28.28 percent of GDP). This can be attributed mainly to the fact that both countries are rich in resources, which reduces their demand for imports, and they possess large domestic markets, which reduces their need for exports. Most of the other countries import resources and export processed products, while Brazil exports resources and primary products and imports processed products.

Brazil's dependency on international trade has also been relatively stable during the ten-year period of 2006–2016 (with a low standard deviation of 1.65 percent of GDP), while the dependency of Germany, France, the UK, Italy, Russia, Japan, and the US is more volatile than that of Brazil (with a standard deviation of 4.12 percent, 3.33 percent, 3.66 percent, 3.26 percent, 2.87 percent, 3.32 percent, and 2.06 percent of GDP, respectively).

All these indicate that Brazil has a high potential to expand its extensive and intensive margin of international economic integration in the future if the country finds that expansion feasible and beneficial for its citizens.

13.13 Factors Expected to Affect the Acceleration of Brazil's International Integration

Brazil is ranked as the fifth largest country in the world in terms of its geographic area (3,286,470 square miles (sm)). It comes after Russia (6,592,735 sm), Canada (3,855,081 sm), the US (3,718,691 sm), and China (3,705,386 sm). Brazil's territory is rich in natural resources, thereby reducing its demand for imports of raw materials.

In 2016, Brazil was also ranked as the fifth largest country in the world in terms of its population (209,567,920). It comes after China (1,382,323,332), India (1,326,801,576), the US (324,118,787, and Indonesia (260,581,100). Brazil's large population supplies a variety of labor resources and effective demand for its GDP, reducing the market pressure for exports.

13.14 Brazil's GDP Per Capita Compared to that of the BRIC, Latin America, and G7 Countries

In 2016, Brazil was ranked as the ninth largest country in the world in terms of GDP (1,793 billion USD), after the US (18,624 billion), China (11,222 billion), Japan (4,949 billion), Germany (3479 billion), the UK (2661 billion), France (2466 billion), India (2274 billion), and Italy (1860 billion USD). The per capita GDP in Brazil was 8556.01 USD, similar to that of Russia (8946.51) and China (8118.10), significantly higher than that of India (1713.56), and significantly lower than that of the US (57,461.80) and Japan (38,476.21).

A country's (GDP) per capita reflects the labor productivity of its labor force and its potential to supply exports at competitive world prices and finance imports. It is frequently used as an index of standard of living although it does not measure personal income. Table 13.18 compares Brazil's GDP per capita to that of the BRIC, Latin American, and G7 countries.

Table 13.18 Ranking of Brazil, BRIC, and G7 economies by GDP per capita in 2017

Table rank	Global rank by IMF	Country	2017 GDP per capita (current USD)
1	7	USA	59,501
2	17	Germany	44,550
3	21	France	39,869
4	22	UK	39,735
5	23	Japan	38,440
6	25	Italy	31,984
7	53	Chile	15,070
8	54	Argentina	14,467
9	62	Russia	10,608
10	65	Brazil	9,895
11	69	Mexico	9,304
12	71	China	8,643
13	139	India	1,983

Source: IMF World Economic Outlook (April 2018) DataMapper, GDP per capita, current prices, Accessed on June 20, 2018. http://www.imf.org/external/datamapper/NGDPDPC@WEO/OEMDC/ADVEC/WEOWORLD

In 2017, the International Monetary Fund (IMF) ranked Brazil 10th among the 12 economies in the BRIC, Latin America, and the G7 countries as listed in Table 13.18, and 65th out of 187 countries ranked that year. Brazil's GDP per capita (9895 USD) was similar to that of the Russian Federation (10,608 USD), Mexico (9304 USD), and China (8643 USD); it was significantly higher than India's (1983 USD) and significantly lower than that of the US (59,501 USD), Germany (44,550 USD), and the rest of the G7 countries.

A low per capita GDP in Brazil, along with an unequal distribution of income, could affect economies of scale in the production of high value-added exports and the rate of its international economic integration.

13.15 Geographic Location and Brazil's Low Dependency on International Integration

Table 13.19 shows how Brazil's dependency on international trade in 2016 compares to that of three representative Latin American countries—Argentina, Chile, and Mexico—and to the BRIC and G7 countries.

We showed in the previous section that Brazil's dependency on international trade is the lowest among the BRIC and the G7 countries. Table 13.19 and Fig. 13.4 show that, in 2016, the relatively low dependency of Brazil on international trade could not be attributed to the geographic location of Brazil and its distance from the markets of the advanced economies of the North. This hypothesis will not be tested econometrically here. It is only based on the observation that Brazil's low dependency on international trade is not shared by other major Latin American economies.[17] Argentina and Chile, which are located further away from those markets in the North, had a volume of international trade that was 40.7 percent and 55.51 percent of their GDP, respectively. This was almost twice as high as Brazil's (23.5 percent), higher than that of India (40.5 percent), China (38.8 percent), Japan (32.5 percent), and the US (26.5 percent). Most spectacular in 2016 was the case of Mexico. Mexico's international trade was 78.9 percent of its GDP. This was more than three times higher than Brazil's (23.5 percent) and almost as high as the one in Germany (85.8 percent).

Table 13.19 Dependency on trade (as a percent of GDP) in 2016 Brazil, BRIC, G7, and representative Latin America countries

Rank	Country	Trade in 2016 (% of GDP)
1	Germany	85.8
2	*Mexico*	*78.9*
3	France	62.7
4	UK	59.7
5	Italy	57.8
6	*Chile*	*55.51*
7	Russian	46.5
8	*Argentina*	*40.7*
9	India	40.5
10	China	38.8
11	Japan	32.5
12	US	26.5
13	*Brazil*	*23.5*

Source (for Exports & Imports): World Trade Organization: World Trade Statistical Review 2017, Tables A6 (p. 102) & A8 (p. 104), https://www.wto.org/english/res_e/statis_e/wts2017_e/wts17_toc_e.htm
Source (for GDP): World Bank: World Bank Open Data, https://data.worldbank.org

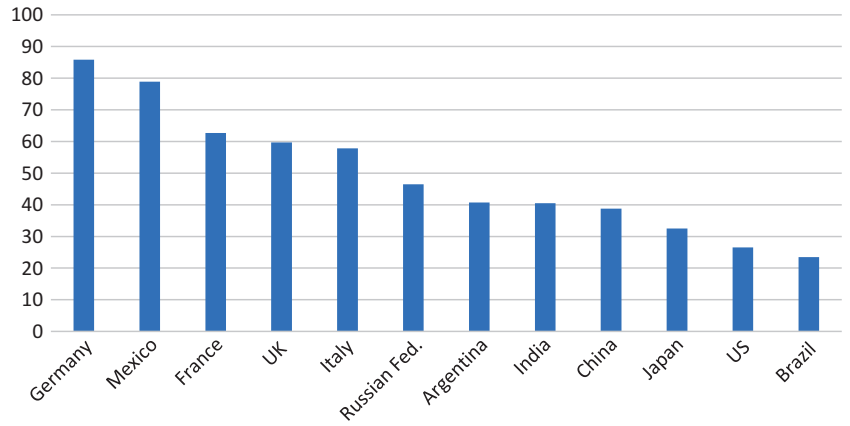

Fig. 13.4 Dependency on trade (as a % of GDP) in 2016 Brazil, BRIC, G7, and representative Latin American countries. (Source: Table 13.19)

13.16 Feasibility Constraints and Deliberate Rational Choice

Brazil's modest integration with the world economy appears to result from either feasibility constraints or deliberate rational choice. We show in Tables 13.14 and 13.15 that Brazil is one of the countries where it is more difficult to start a new business. This is a feasibility constraint because it could discourage FDI and investors to use Brazil for the production of exports to the rest of the world. Also, the export business in Brazil is concentrated in a small number of very large and stable exporting firms (World Bank 2014), making it difficult for new smaller firms to enter the export business. The share of exporters among all formal-sector firms is less than 0.5 percent. The top 1 percent of exporting firms generates 59 percent of total exports, while the top 25 percent of firms account for 98 percent of exports (Canuto 2015). This is another feasibility constraint to higher levels of international trade and economic integration. There are more feasibility constraints discussed in the literature. Although there are very interesting insights in this literature we will not review this literature here. Instead, we will stop with the idea that Brazil's low international economic integration could be a result of a deliberate rational choice.

13.17 International Integration and Income Distribution

International integration offers to the trade partner countries a mixed basket of benefits. It has benefited the world economy as a whole, but not all participating countries benefited equally from their trade engagements. The MGI has estimated that, thanks to global flows of goods, services, finance, data, and people, the world GDP is more than 10 percent higher—some $7.8 trillion in 2014 alone—than it would have been had economies remained closed and less integrated.[18]

This increase in wealth for the global economy has narrowed the inequality among countries, but it has increased income inequality within countries.[19] During the decade from 1998 to 2008, the income growth for

the middle class in advanced economies was almost zero, but the incomes for those at the top of the global income distribution increased by almost 70 percent.[20] Half of the global top 1 percent of those who received a large share from the global benefits of economic integration were top earners of the US.[21] Countries that were more interconnected received a larger share of the increased global benefits, and the US is ranked third among the 195 countries on MGI's Connectedness Index. The BRIC emerging economies have also benefited from their international integration through their export-oriented industrialization.[22] Although the emerging economies trade as intensively as the advanced economies, the latter were four to nine times as deeply integrated in international capital, information, and people flows,[23] which carry a higher profit margin.

13.18 Implications of Brazil's International Integration and Concluding Remarks

What are the implications for Brazil and for the world economy resulting from Brazil's economic integration based on either more or less extensive and intensive trade? A short review of the relevant literature reveals interesting answers and identify topics for further reading and research. It also provides concluding remarks to this chapter.

A study by Miller and Upadhyay (2000) of the effects of international economic openness, trade orientation, and human capital on total factor productivity and economic growth for a pooled sample of developed and developing countries showed that higher international economic openness benefits total factor productivity. Outward-oriented countries experience higher total factor productivity over and above the positive effect of openness. All countries, Brazil included, would benefit from productivity enhancement.

Shahbaz (2012) has also shown that in the long run, trade openness promotes economic growth. The effect of openness on growth volatility is shown by Haddad et al. (2013) to be negative for a significant proportion of countries with relatively diversified export baskets. Trade openness reduces growth volatility when countries are well diversified. Higher total factor productivity, associated with reduced economic growth volatility, results in higher economic benefits, output, and income.

Economic benefits and income from international economic openness, though, are not equitably distributed among trade partners or among the different sectors of the trading countries.

According to the dependency theory of the late 1950s, international economic integration, which supports economic growth and stability in the industrialized countries, does not necessarily result in growth and stability for the less advanced economies. Integration through a liberal and unprotected trade between industrialized and less advanced economies often results in serious economic problems for the poorer countries. This empirical finding contradicts the neoclassical theory, which advocates that economic growth from international trade and economic integration is beneficial to all (Pareto optimal) regardless of an unequal distribution of benefits (Ferraro 2008).

The rapid pace of international economic integration, based on trade and financial flows over the past two decades, is different from the one described by the dependency theory of the 1950s. The recent economic integration, based on expansion of international trade, has been associated with a rise in income inequality observed in most countries,[24] including the advanced economies, which were thought to have reached levels of prosperity where inequality would level off in line with the predictions of the *Kuznets hypothesis*[25] (Kuznets 1955). Openness to international trade has also created the higher growing number of billionaires in the emerging economy of China, a communist country with a per capita GDP of 8118 USD in 2016.

Econometric estimates, though, by Jaumotte et al. (2013) reveal that over the past two decades, the impact of technological progress is greater than the impact of international economic integration on inequality. The overall impact of international economic integration reflects two offsetting tendencies: whereas international economic integration based on trade is associated with a reduction in income inequality, an international economic integration based on financial flows, and especially on foreign direct investment, is associated with an increase in inequality. Export growth is associated with a rise in the income shares of the bottom four quintiles and a decrease in the share of the richest quintile. In contrast, international economic integration based on financial flows and technological progress is shown to benefit mainly the richest 20 percent of the population.

Results by Daumal (2013), from time series regressions, show that Brazil's trade openness contributes to a reduction in regional inequalities. The opposite result is found for India. India's trade openness is an important factor aggravating income inequality among Indian states. In both countries, inflows of FDI are found to increase regional inequalities. The observed overall reduction in Brazil's regional inequality is a result of its openness in trade of primary commodities being higher than its openness to FDI inflows, which increase regional inequality.

A literature survey of cross-country studies by Brülhart (2011) finds no significant effect of trade openness on urban concentration or regional inequality. Other things equal, regions with inherently less costly access to foreign markets, such as border or port regions, stand to reap the largest gains from trade liberalization. Whether trade liberalization in Brazil will rise or lower regional inequality depends on Brazil's specific geography and not on its international trade policy.

The implications from an international integration depend upon the principles of integration. The effort of Brazil and the G-20 emerging economies to integrate with the world economy is based today on the principle of economic interdependence with reciprocity and justice. The G7 countries resisted initially this principle, advocating free and unprotected trade with liberal exploitable dependency. By 2018, though, we see that even the G7 countries rely on the principle of interdependence with reciprocity and justice in retaining the level and intensity of their economic integration with their trade partners.

Adserà and Boix (2002) have shown that higher levels of international economic integration may lead to a larger public sector. As openness and trade intensity increases, the state, acting as a social planner, may adopt a salient role to minimize the risks of economic integration and secure social peace. Both trade and fiscal policies are highly redistributive. As a result, Brazil may embrace protectionist policies to shore up the welfare of key domestic sectors without engaging, therefore, in substantial public spending. To maintain trade openness in democracies, though, policymakers may develop compensation policies to muster the support of the losers of openness. Given the tax burden of public compensation, pro-free trade sectors may impose an authoritarian regime to exclude (instead of buying off) their opponents.

Avelino et al. (2005) have found that trade openness had a positive association with education and social security expenditures in Latin American countries. Moreover, financial openness does not constrain government outlays for social programs, and democracy has a strong positive association with social spending, particularly on items that bolster human capital formation. Human capital and physical capital are positively related to economic growth in the long run. The result of the Granger Causality Test, performed by Hye and Lau (2015), confirms the validity of the trade openness-led growth and human capital-led growth hypothesis in the short run and in the long run. Brazil's economic growth can be enhanced through an expansion in the human capital of its labor force and/or through an expansion in the trade openness of its economy.

Combes and Saadi-Sedik (2006) have shown that trade openness affects budget balances of internationally integrated countries. Trade openness increases a country's exposure to external shocks. This enforces the negative impact on budget balances of terms of trade instability. Additionally, trade openness influences budget balances through several other channels: corruption, income inequalities, and so on. When trade openness is natural, it deteriorates budget balances; when trade openness is a result of trade policy, it enhances budget balances.

Openness to trade is one factor that has been identified as determining whether a country is prone to sudden stops in capital inflows. Having a large tradable sector reduces the contraction necessary to adjust to a given cutoff in funding. Cavallo et al. (2008) have found that openness indeed makes countries less vulnerable to crises, and that the relationship is even stronger when correcting for the endogeneity of trade. Brazil's further openness to trade and international economic integration would make its economy less vulnerable to financial crisis from a sudden interruption of international capital inflows.

Another study spanning 88 countries over 1960–2005 shows that a positive long-run relationship between trade openness and financial development coexists with a negative short-run relationship. But when splitting the data into different income or inflation groups, this finding is observed only in relatively low-income countries or high-inflation economies (Kim et al. 2010). Brazil is a relatively low-income country, with a per capita GDP of 8556 USD in 2016, and an inflation rate relatively

under control. It might be possible, therefore, to have a positive long-run relationship between trade openness and financial development coexisting with a negative short-run relationship.

There are welfare costs associated with a country's exposure to shocks and uncertainty linked to trade openness—a prominent issue in international debate. For a comprehensive review of the literature on the destabilizing effects of trade openness, drawing together studies in different fields, see Montalbano (2011). It provides a conceptualization of vulnerability and three promising lines of reasoning (macro, micro, and meso) for future research on the link between trade and vulnerability.

Although trade liberalization and trade openness are assumed to be strongly associated with each other and are often used interchangeably, the empirical evidence has not been forthcoming. Subasat (2008), by investigating the link between trade openness and trade restrictions, argues that while a negative link between various types of trade restrictions and trade openness is evident, the relationship is weak, statistically not always significant, and there is no clear evidence that the removal of trade restrictions (trade liberalization) invariably leads to improved trade openness. Brazil, therefore, can rely on trade restrictions and the principle of interdependence with reciprocity and justice without jeopardizing the openness of its economy to trade partners who stand to benefit from trading with Brazil because, in trade, what you get is not always what you deserve but what you negotiate. The US had an open economy to unrestricted trade with China in 2017 and deserved reciprocity from China which was not forthcoming. The US had to rely on trade restrictions (tariffs) and the principle of interdependence with reciprocity and justice to negotiate the openness of the Chinese economy which the US deserved.

Researchers have available to them numerous indicators of financial openness and integration, many of which have yielded substantially differing results in past research, for example, on the relationship of financial openness or integration with economic growth. Quinn et al. (2011) have reviewed the main indicators and found that de jure vs. de facto indicators yield systematically different growth results. Among de jure indicators, sample differences account for much of the variation in growth results, with a weaker impact found in more recent data and among the advanced economies. They also found that many indicators capture different and useful

facets of financial openness, such as intensive versus extensive measures and de facto versus de jure indicators. A small minority of indices suffer weaknesses that make them not useful for rigorous economic analysis, most notably the Investment Freedom Index by the Heritage Foundation.

Countries with a similar outward-oriented international economic integration do not register similar economic growth because a similar level of trade openness can hide different types of trade structures. Based on the estimation of an endogenous growth model on a panel of 169 countries between 1988 and 2014, Huchet-Bourdon et al. (2018) found that countries exporting higher quality products and new varieties grow more rapidly. Openness to trade may impact growth negatively for countries specializing in low-quality products. Countries increasing their exports will grow more rapidly after reaching a certain degree of the extensive margin of exports. So, expanding the current extensive and intensive margins of its international economic integration does not suffice for Brazil to harvest higher economic benefits if its exports lack higher quality and new variety when they are dominated by agricultural and primary products. When the Huchet-Bourdon (2018) findings become broadly discovered and adopted to guide trade policy, then international economic integration will deliver to the engaged countries not only higher economic growth, output, and income but also higher quality of products and new varieties of them.

Notes

1. A geographical diversification of bilateral relationships is an example of a measure of extensive international openness. This can be computed as the ratio between the number of actual partners and the total number of potential partners (the total number of countries in the world). A more precise measure of diversification as a measure of extensive international openness is the inverse of the Herfindahl concentration index, sometimes called the "number of equivalent partners".
2. The trade-to-gross domestic product (GDP) ratio with a given country is one example of a measure of intensive international openness.
3. The international trade statistics of Mexico are significantly influenced by Mexico's membership in North American Free Trade Agreement

(NAFTA), the regional group of economic integration for the three countries of North America, Canada, the United States, and Mexico.

4. English Proficiency Index website.
5. See: Elstrodt Heinz-Peter et al. (2014), *Connecting Brazil to the world: A path to inclusive growth*, The McKinsey Global Institute (May). There is extensive literature on the relationship between competitiveness, trade openness, and productivity. See, for example, Richard E. Baldwin, On the growth effects of import competition, National Bureau of Economic Research working paper number 4045, April 1992; Philippa Dee et al., The impact of trade liberalization on jobs and growth, OECD trade policy working paper number 107, January 2011; and Otaviano Canuto, Matheus Cavallari, and Jose Guilherme Reis, Brazilian exports: Climbing down a competitiveness cliff, World Bank policy research working paper number 6302, January 2013.
6. Three branches of "dependency theory" can be identified in the economics literature. The debates among the liberal reformers [inspired by Prebisch (1950 and (1959)], the Marxists [Andre Gunder Frank)], and the world systems theorists [Wallerstein (1974)].
7. See: Prebisch Raúl (1950) and (1959).
8. This summary of the Dependency Theory is based on Ferraro (2008).
9. Exploitable dependency relies upon a belief that there exists a clear "national" economic interest which can and should be articulated for each country. This national interest can only be satisfied by addressing the needs of the poor within a society rather than through the satisfaction of corporate or governmental needs. Trying to determine what is "best" for the poor is a difficult analytical problem over the long run. Dependency theorists have not yet articulated an operational definition of the national economic interest.
10. Low per-capita income in developing countries reduces the domestic market for domestic production of industrial goods, and low investment in human capital reduces labor productivity and international competitiveness of domestic production. As a result, the ability of a developing country to create jobs for its own labor force and create a market for its own domestic industrial production curtails its economic power in international trade negotiations.
11. The disparity in the distribution of economic benefits from an exploitable dependency among trade-partner countries is not only a result of capitalism, as the dominant economic system in the world economic order, as the Marxian views of Frank (1967) and (1967 [1969]) advocate but also a result of "captured" governments of developing countries by their elites.

12. New York Daily Intelligencer, July 2, 2018, http://nymag.com/daily/intelligencer/2018/07/trumps-u-s-fart-act-would-pull-america-out-of-the-wto-united-states-fair-and-reciprocal-tariff-act.html
13. See President's statement at: https://www.whitehouse.gov/briefings-statements/statement-president-regarding-trade-china-2/
14. See Bob Bryan (2018), "It's On: Trump's trade war kicks off with tariffs on $34 billion worth of Chinese goods", Business Insider, July 6. http://www.businessinsider.com/trump-china-trade-war-tariffs-go-into-effect-soybeans-tech-2018-7
15. Observations on this section are based on Cervo 2010.
16. Cervo Luiz Amado 2010. A ascensao do Brasil no cenario internacional: o Brasil e o mundo (Brazil's Rise on the International Scene: Brazil and the World). *Revista Brasileira de Politica Internacional* 53 (special edition): 7–32.
17. This hypothesis should consider the fact that part of their trade with Brazil takes place within the group of the Mercosur countries while Mexico is bordering the US and is a member of NAFTA.
18. See: https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows
19. See: http://rodrik.typepad.com/ is global equality the enemy of national equality. Pdf
20. See: http://www.mckinsey.com/global-themes/employment-and-growth, poorer-than-their-parents-a-new-perspective-on-income-inequality.
21. See: http:/www.hup.harvard.edu/catalog.php?.isbn=9780674737136
22. See: https://www.weforum.org/agenda/2017/02/why-globalization-isnt-it-in-retreat-its-gone-digital
23. See: http://www.dhl.com/content/dam/downloads/g0/about_us/logistics_insights_2016/dhl_gci_2016_full_study.pdf
24. For representative empirical trade literature on the effects of international economic integration on inequality see: Feenstra and Hanson (1996); Borjas et al. (1997); Broda and Romalis (2008); Krugman (2008); Goldberg and Pavcnik (2007). For representative literature on the effects of international financial flows on growth and volatility, see: Prasad and others (2007) and Kose and others (2009). For the effects of financial globalization on inequality, see: Roine et al. (2008); Claessens and Perotti (2007); and Demirgüç-Kunt and Levine (2007).
25. For a comprehensive review of the empirical literature testing Kuznets' hypothesis, see Fields (2001)

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