Changing Dynamics of World Trade

The Role of Service Offshoring and the Effect of the Regional Comprehensive Economic Partnership (RCEP) Agreement

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Marc Dominic Atkins

born October 19th, 1992 in Paderborn Germany

Erstgutachter: Prof. Dr. B. Michael Gilroy
Zweitgutachter: Prof. Dr. Yuanhua Feng

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To my family, I dedicate this dissertation. Their ceaseless encouragement through every phase of my life has been the bedrock of my achievements. I am especially grateful to my parents, Marion and Peter, and to my beloved wife, Juliane.

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List of Abbreviations

APARCH	Asymmetric Power ARCH (model)
ARCH	Autoregressive Conditional Heteroskedasticity (model)
ASEAN	Association of Southeast Asian Nations
ACF	Autocorrelation function
BC	Before Christ
BEC	Broad Economic Categories (classification)
BIC	Bayesian Information Criterion
BOP	Balance of payments
CAI	Comprehensive Agreement on Investment
CDR	Credit to deposit ratio
CGARCH	Component GARCH (model)
CGE	Computable General Equilibrium
CPS	Domestic credit to private sector
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
D13T15	The textiles, wearing apparel, leather and related products industry
D26	The computer, electronic and optical products industry
D29	The motor vehicles, trailers and semi-trailers industry
D45T47	The wholesale and retail trade; repair of motor vehicles industry
EGARCH	Exponential GARCH (model)
ETF	Exchange-Traded Fund
EU	European Union
FATS	Foreign affiliates statistics (framework)
FDI	Foreign direct investment
FVAiX	Foreign value-added in exports
FTA	Free trade agreement
GARCH	Generalised Autoregressive Conditional Heteroskedasticity (model)
GATT	General Agreement on Tariffs and Trade
GDP	Gross domestic product
GVC	Global value chain
ICT	Information and communication technology
ILO	International Labour Organisation
IQR	Inter-quartile range

ISIC	International Standard Industrial Classification
MNE	Multinational enterprise
MFN	Most-favoured nation
M&A	Mergers and acquisitions
NAFTA	North American Free Trade Agreement
NIE	Not included elsewhere
NTB	Non-tariff barrier
OECD	Organisation for Economic Cooperation and Development
QQ plot	Quantile-quantile plot
RCEP	Regional Comprehensive Economic Partnership
R&D	Research and development
SD	standard deviation
SME	Small- and medium-sized enterprises
SPE	(Resident) Special purpose entity
TiVA	Trade in value-added
TPP	Trans-Pacific Partnership
UK	United Kingdom
UN	United Nations
USA	United States of America
USMCA	United States-Mexico-Canada Agreement
WTO	World Trade Organization
VaR	Value at Risk
$	U.S. dollar
$ bn	Billion U.S. dollar
$ tn	Trillion U.S. dollar
n/a	Not available or not applicable

1 Introduction

The global trade landscape is complex and changing fast with recent years posing new challenges in times of the US-China trade war, the COVID-19 pandemic with its extensive and diverse consequences, economically for instance the shortage of semiconductor chips and other supply chain disruptions, military conflicts such as between Ukraine and Russia following Russia's invasion of the Ukraine or the exit of Great Britain from the European Union (EU) that was also followed by trade challenges. Effects of these crises are set to persist to some extent with resource-abundant nations in advantageous positions (Petri and Plummer, 2023).

The trade war between the world's two largest economies United States of America (USA) and China is merely one example of recent political and economic developments that are characterised by a resurgence in protectionist policies. Although claiming to be aimed at safeguarding domestic trade and employment, these are often enforced at the expense of free, international trade, creating unforeseen circumstances, substantial disruptions of global supply chains and severe challenges for both businesses and policy-makers.

This comes at a time of increased international fragmentation of production and global value chains (GVCs). Global imports of goods in 2022 surpassed 20 trillion U.S. dollars ($ tn) (UN Comtrade, 2023). Moreover, the share of intermediate imports or offshoring is an indicator of production fragmentation and has been rising over time to reach approximately 59 percent in 2020 (OECD, 2023a).

Free trade agreements (FTAs) unite nations on shared goals based on the principles of free trade, leading to reduced tariffs and other barriers to trade. Therefore, they counteract provisions of protectionism and economic isolation for their members. Having evolved from large international agreements like the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO) today's trade policy ecosystem exhibits numerous bilateral and several larger regional agreements. The Regional Comprehensive Economic Partnership (RCEP) is the FTA that creates the largest free trade zone worldwide and accounts for approximately 30 percent of the world's aggregate economic output and 28 percent of world trade (UN Comtrade, 2023). Its countries inhabit approximately 2.3 billion people and RCEP is considered the most rigorous FTA ever formed by relatively less developed economies. Because of its influence it significantly alters the world economy as value chains within the RCEP cluster and with its trading partners are being rearranged through enhanced regional integration in East Asia (Petri and Plummer, 2018). It leads to additional international trade in the region and contributes to the economic centre of

gravity moving towards Asia. This makes trade liberalisation a common ground between the members in the region despite local political tensions and (for the members of RCEP) counter-acts the trend of protectionism seen in many regions across the world (Matthes and Kolev, 2020).

Offshoring and FTAs present highly intricate and challenging environments for research, policy-makers and practitioners alike due to their multifaceted nature and global reach together with the dynamic nature of the global economic landscape. The complexity, on the one hand, arises from the convergence of economic, social, technological, and political factors that influence trade decisions. On the other hand, it stems from the challenge to connect relevant theoretical foundations, existing knowledge from literature and findings based on the latest data. Researchers face the task of comprehensively analysing the interplay of these variables and their impact on different industries and economies. The circumstances in economics as a science encompass the dynamic nature that we see for the global trade environment in the sense that yesterday's most advanced or suitable research method as well as latest data might already be different today. Offshoring practices vary widely across countries and industries, necessitating adaptable research methods to address the diverse contexts. Moreover, FTAs involve negotiating and navigating complex trade policies, tariffs, and regulations among multiple countries. Researchers and practitioners face the need to understand the legal intricacies and implications of these agreements. For practitioners, navigating the complexities of international business operations, including legal and regulatory frameworks, cultural differences, and supply chain management demands astute decision-making and risk management strategies. Data availability and quality present additional challenges, as obtaining accurate and comprehensive data from diverse sources across borders can be difficult. Successful research and practice in the realm of offshoring and FTAs require a sophisticated understanding of global economic dynamics, strategic planning, and the ability to adapt to ever-changing international landscapes.

This dissertation analyses offshoring as one of its main topics and in doing so addresses several of the discussed issues. To answer the question what the key theoretical foundations of international sourcing are and how they apply to today's reality, Chapter 2 conducts a thorough theoretical analysis of sourcing strategies based on the renowned model by Antràs and Helpman (2004) and derives how this applies to the world economy of the past and the present. This is combined with established empirical facts from literature as well as an analysis of recent international trade data, with this combination addressing the

difficulty of a complex environment for research, policy-makers and practitioners. In the context of the trade data analysis, this dissertation discusses and presents state-of-the-art measurement of international trade, concerning the issue of a fast-changing research environment. This is then applied specifically to the offshoring of service activities, yielding valuable implications for theory, practitioners and policy-makers alike.

FTAs are a central political instrument for supporting international trade and economic growth. However, they counter-act protectionist provisions only for the members of such an agreement. FTAs have the potential to yield direct cost savings and unlock comparative advantage, leading to beneficial structural changes. Moreover, they can induce productivity effects resulting from scale economies brought about by new market opportunities, firms adapting to international competition, foreign direct investment (FDI), and participation in GVCs. Therefore, there is a need to understand the consequences of large FTAs. This dissertation examines the impact of the world's largest FTA RCEP on the world economy and in particular, in much more detail, on the German economy on both the country- and the industry-level. It provides answers to the research question of how Germany should best react economically and politically in order to benefit most from the agreement and its consequences as well as to mitigate negative effects. The analysis in its depth, especially regarding the most affected sectors, is a new contribution to literature.

Furthermore, while trade decisions of and with RCEP member countries are influenced by the stability and associated risk of financial markets within the RCEP zone, we know little about the impact of the world's largest FTA on the financial markets, even concerning its most affected sectors. Therefore, this dissertation contributes to literature by addressing this issue. The largest financial markets as well as most relevant industries of the RCEP members in terms of volatility and risk are examined using various GARCH models accompanied by an event analysis.

Part of the research on offshoring in this dissertation was published in scientific journals. The two following contributions to literature contain a discussion on state-of-the-art measurement of international trade, their application in terms of an analysis of offshoring of goods and services and a discussion on its findings and resulting policy implications.

Atkins, M., Gilroy, B. M. & Seiler, V. (2019). New Dimensions of Service Offshoring in World Trade. Intereconomics, 54(2), 120-126.

Atkins, M. & Gilroy, B. M. (2021). Service Offshoring in neuen Dimensionen. WiSt - Wirtschaftswissenschaftliches Studium, 50(4), 52-58.

This dissertation contains substantial additions to these publications, namely the entire sourcing strategy model analysis together with the derivation how this applies to the world economy, the analysis of state-of-the-art measurement of international trade in its depth as well as a much more detailed application of the latter to offshoring of services on country- and sector-level followed by a thorough examination of policy implications. Moreover, the trade analysis that is contained in the publications has been updated for this dissertation with more recent data, yielding additional findings and implications. Furthermore, in establishing the key research objectives discussed above, this dissertation answers additional questions, namely: How has world trade evolved from the initial separation of production stages to the present world economy of widespread international fragmentation of production and GVCs? In how far is the traditional view of offshoring between developed and developing economies reflected in today's world economy? How important is service offshoring as opposed to the offshoring of goods in general and specifically across sectors? What are the factors that encourage and impede offshoring, and what are the implications resulting from this? What do countries need to do in order to upgrade their economies, performing more higher-value activities?

Part of the research on RCEP and its impact on the German economy was published as

Atkins, M., Peitz, C. & Gilroy, B. M. (2023). Impact of the Regional Comprehensive Economic Partnership (RCEP) Agreement on the German Economy. International Journal of Asian Social Science, 13(7), 204-224.

Additions in this dissertation include several aspects, including the analysis of the motivation for countries to form FTAs, how trade regulations have evolved from GATT and WTO and illustrate the gap that the recent regional FTAs RCEP and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) are able to close. Moreover, this dissertation provides more context on the RCEP agreement, India's withdrawal and future accessions. A more detailed comparison of RCEP and CPTPP and the analysis of their effects on world trade and other metrics like income are included as well as a perspective on (foreign direct) investment in China.

Additionally, part of the research on the financial market and risk analysis of RCEP was published as

Atkins, M. & Peitz, C. (2023). The world's largest free trade agreement RCEP and its financial markets: A perspective on volatility and risk. Dissertation Working Paper Series, University of Paderborn.

Additions in this dissertation include a more detailed perspective on the theoretical foundations of ARCH and GARCH models along with their extensions as well as the derivation of the specific application of GARCH models for the subsequent analysis. Moreover, Chapter 4 of this dissertation provides a more extensive empirical analysis, for instance, regarding correlations and the examination of longer time spans regarding volatility and risk, yielding a comparison of the stock market effect of RCEP with that of the COVID-19 pandemic. This provides support for the financial market theory regarding stock market reactions to shocks. More importantly, the additions encompass a more thorough discussion of how the relevant theory of financial market analysis, discussed in the literature review in Section 4.1, connects to the findings of the empirical analysis.

Although, as highlighted above, the topics of this dissertation are highly connected, their approach is heterogeneous. Therefore, several aspects are discussed within each of the chapters, including theoretical frameworks underpinning the research, methodology, scope and definitions as well as relevant literature.

The remainder of this dissertation is structured as follows. Chapter 2 presents the analysis on offshoring, commencing with the theoretical analysis of sourcing strategies based on the renowned model by Antràs and Helpman (2004) and combining it with empirical facts from literature as well as, in the latter part of the chapter, findings from international trade data with a focus on service offshoring. Chapter 3 presents the analysis on RCEP and its global impact with a focus on its effect on the German economy, starting with the country-level and proceeding with the sector-level analysis. Chapter 4 presents the financial market and risk analysis of RCEP's members on country- and industry-level.

2 Offshoring and the service industry

2.1 Introduction

The practice of offshoring serves as a widely employed method by companies to acquire production inputs. Its foundation lies in the early stages of specialisation and trade, incorporating the principle of comparative advantage alongside significant advancements in transportation as well as information and communication technology (ICT) within modern history.

Offshoring facilitates overall improvements in welfare, fostering increased productivity, wages, skill intensity within activities performed, and a broader array of products. Nonetheless, public criticism is not unfounded, as not all market participants necessarily gain from offshoring. Some employees may be confronted with structural unemployment and experience diminished wages after displacement. The quality of institutions plays a crucial role in ensuring that the benefits of offshoring are realised and equitably distributed.

In recent decades, the landscape of offshoring has witnessed a dynamic evolution characterised by increasing production fragmentation and the emergence of GVCs, which are defined by the geographical dispersion of different production stages across multiple countries, encompassing production, trade, and investments. Complex GVCs have been the most prominent driving force behind globalisation since the late 20^{th} century, with service offshoring playing a pivotal role in this context. Moreover, GVCs provide developing countries with opportunities to enhance their participation in the global economy, benefit from knowledge transfers and technology diffusion, engage in higher value-added activities, and upgrade their economies. However, the realisation of these benefits hinges on the openness to foreign investment and the existence of effective and efficient institutions within these countries. Central to this process are multinational enterprises (MNEs) and their strategies for international sourcing. MNEs play a key role by heavily investing in foreign markets to leverage efficiency advantages and internationalising their supply chains. Despite the perception of an increasingly globalised world, trade data reveals the persistence of three dominant regional clusters: North America, Europe, and East Asia.

The continuous advancements in ICT have made it economically viable to separate the production and consumption of service activities. This is observed in domains such as software development, financial and banking services, and research and development (R&D) tasks. Favourable locational conditions in foreign countries, improved efficiency in transportation, communication, and business services, along with the globalisation of

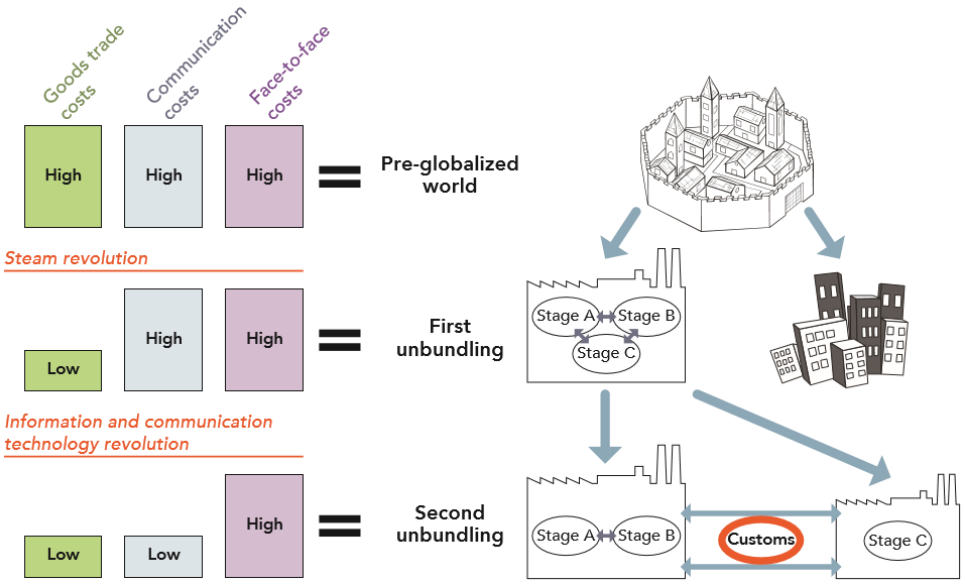
MNEs, contribute to this trend. Trade in value-added (TiVA) data, which focuses on the value added by each country to a good or service, illustrates that service offshoring is larger and growing at a faster rate than suggested by conventional trade measures. In fact, the share of services in total world value-added exports has increased from under 30 percent in 1980 to over 40 percent in 2009 (OECD, 2023a). Notably, high and increasing shares of service value-added are particularly pronounced in business services and the manufacturing industry. Manufacturing companies increasingly engage in service activities to add value, establish robust customer relationships, and exploit competitive advantages. Consequently, this phenomenon coincides with a growing convergence between service and manufacturing industries.

In order to set the basis for the forthcoming sections and chapters, let us take a closer look at the fundamental principles of world trade and how this has developed over time.

Patterns of specialisation and trade

The practice of trade predates the existence of money itself. Throughout history, people have engaged in the exchange of goods and services, utilising commodities as a means of transaction. Barter-like systems, where individuals directly swap one good or service for another, can be traced back thousands of years, potentially even surpassing 100,000 years (Andrei, 2011). As communities began to form, the concept of specialisation emerged, enabling individuals to concentrate on specific activities. This marked the initial stage of productivity gains derived from the division of labour. Adam Smith describes this as the separation of tasks within a system, allowing participants to specialise (Smith, 1776). However, productivity gains were hindered by a challenge known as the double coincidence of wants, a term first introduced by Jevons (1893). In barter systems, for a trade to occur, both the supplier of one good and the supplier of another good must mutually desire what the other has to offer (Ostroy and Starr, 1990). The introduction of universally desired mediums of exchange eradicated the limitations imposed by the reliance on the double coincidence of wants, as each side of the transaction could be separated (Graeber, 2011). Goods such as salt, sugar, and tobacco were considered universally desired in specific regions (Smith, 1776). While metallic coins, such as gold and silver, were used as early as 600 BC in present-day Turkey (Graeber, 2011), the inception of paper money dates back to the 11$^{\text{th}}$ century in China (Headrick, 2009). Its introduction to Europe occurred several centuries later, facilitated by travellers like Marco Polo and William of Rubruck, who

Figure 2.1: Three cascading constraints of globalisation



Source: World Bank (2017) based on Baldwin (2011)

witnessed its usage in China during the 13th century (Moshenskyi, 2008). The adoption of standardised paper money as a medium of exchange reduced transaction costs and imposed new boundaries on economic activity within any given economy. In addition to notable milestones such as the inventions of electricity or the wheel, it was the innovations of the steam engine and the steamship that set new limits and ultimately triggered the Industrial Revolution in the latter half of the 18th century.

Figure 2.1 depicts the transition from a pre-globalised to a globalised world, marking the initial unbundling of production stages. As the ability to separate production and consumption emerged, scale economies and comparative advantages contributed to the reduction of transportation costs, enabling trade over vast distances to become economically viable. Additionally, these advancements facilitated the shift towards new manufacturing processes and industries. However, owing to the limitations of simple communication technology during that era, the efficiency of intricate supply chains and manufacturing processes relied heavily on geographic proximity among involved parties (Baldwin, 2011).

Significant improvements in transportation, exemplified by the advent of railroads and steamships, materialised only in the late 19th century. During the period between 1890 and the First World War, which Feenstra and Taylor (2014) label as the first golden age of trade, countries such as the United Kingdom (UK), Australia, Canada, Japan, and

the USA experienced their highest-ever levels of trade relative to gross domestic product (GDP). However, the years between the two world wars witnessed a surge in global tariffs causing rising trade costs and resulting in a significant decline in global trade, soon followed by the Great Depression and the Second World War.

In response to these developments, the allied countries convened after the Second World War, ultimately establishing the GATT, which subsequently evolved into the present-day WTO (Feenstra and Taylor, 2014). The introduction of the shipping container in 1956 further contributed to a decline in transportation and trade costs, heralding the onset of the second golden age of trade. During this era, global trade expanded, particularly in intermediate inputs, as numerous countries regained or exceeded their previous peak trade-to-GDP ratios from the initial golden age of trade. Remarkable advancements in ICT, particularly towards the latter part of the 20^{th} century, have profoundly transformed the landscape of international trade.

While the Industrial Revolution's developments made the geographical separation of manufacturing stages possible, the ICT revolution made it economically viable (Baldwin, 2011). This marked a significant milestone towards future offshoring and large-scale outsourcing. Previous constraints on international trade were overcome, allowing economic agents to effectively leverage their comparative advantages through the internationalisation of supply chains and the fragmentation of production. Figure 2.1 illustrates this progression, transitioning from the first to the second unbundling of production stages. Communication costs decreased, leading to the offshoring of specific production stages. A key factor in this regard is the disparity in wages across countries, enabling nations to leverage their technology with lower-wage labour from abroad.

Previously, countries lacking the capacity to establish domestic supply chains in certain industries could now participate in GVCs and international trade. This significant development played a prominent role in driving the regionalisation of supply chains in the late 20^{th} century (Baldwin, 2011). Furthermore, as international trade increased and production became more fragmented, the need for coordinating production stages intensified. This prompted companies to relocate certain activities including service tasks abroad, leading to service offshoring. This allows organisations to effectively manage and align production processes in response to increased international trade and production fragmentation (Baldwin, 2011). The combination of technological advancements, wage differentials, and the global fragmentation of production redefined the dynamics of international trade. This

not only motivated the regionalisation of supply chains but also spurred the emergence of service offshoring as a strategic component of modern business operations. Continuous advancements in transportation and ICT have greatly influenced international trade. Nowadays, the manufacturing process of a final product often involves the participation of multiple nations, with components being shipped back and forth between countries. These developments have particularly significant implications for service offshoring, which is explored in detail in Section 2.4.

Another noteworthy development is the financial crisis that commenced in 2008, originating in the USA and subsequently spreading to numerous countries. This crisis inflicted significant economic damage and resulted in a decline in international trade. The affected countries experienced a prolonged period of recovery, taking several years to restore trade levels and trade-to-GDP ratios to their pre-crisis benchmarks. The COVID-19 pandemic caused similar disruptions to international trade as the global health crisis led to widespread economic lockdowns, travel restrictions and supply chain disruptions, affecting trade flows across various industries and regions. The pandemic resulted in a sharp contraction in global trade, as countries focused on safeguarding public health and addressing domestic priorities. While the full extent of the pandemic's impact on international trade is still unfolding, it has highlighted the interconnectedness and vulnerability of global supply chains, prompting governments to reassess their trade policies and strategies in the face of future crises.

Irrespective of the COVID-19 pandemic, recent economic developments have witnessed a resurgence in protectionist policies aimed at safeguarding domestic trade and employment, often at the expense of international trade. Notably, the imposition of tariffs, trade barriers and retaliatory measures between the two largest global economies USA and China, also referred to as the US-China trade war, serves as a prominent example of this trend and has created substantial disruptions in international trade flows and supply chains. Other prominent examples of the recent past include the withdrawal of the UK from the EU, commonly known as Brexit, and trade disputes between the USA and the EU, for instance concerning subsidies to the aircraft manufacturers Boeing and Airbus. These protectionist measures, driven by concerns over trade imbalances, intellectual property rights, and national security considerations, have injected uncertainty into the global economic landscape. The escalating tensions and trade frictions between major economies underscore the complexities surrounding protectionism and its impact on international

trade dynamics. While proponents argue that such policies protect domestic industries and jobs, critics caution that they can impede overall economic growth, hinder innovation, and lead to higher costs for consumers.

The analysis in this chapter proves overall gains from international trade while Chapter 3 analyses the consequences of the world's largest FTA RCEP in detail. The latter constitutes a profound example of trade-enhancing measures, since it unites 15 economically as well as culturally diverse countries. That fact that the region is not short of its own examples of past trade frictions, especially between the agreement's largest economies China, Japan and South Korea, emphasise the significance of this FTA.

Before turning to the forms of global sourcing, let us discuss the underlying reasons for trade explaining the trade pattern that we see in today's world economy in more detail.

In a world prior to globalisation and before the steam revolution, proximity between trading parties served not only as a reason for trade but also as a constraint. The proximity to trading partners continues to be associated with lower transportation costs, rendering it a significant factor in trade dynamics. Consequently, FTAs often emerge among neighbouring countries, leveraging the benefits of geographical proximity. Resources also play a pivotal role in shaping trade patterns, as they represent essential factors of production encompassing natural resources, labour, and capital. For example, if Saudi Arabia did not possess a substantial share of the world's oil reserves, countries would likely engage in significantly less trade with it. Moreover, trade occurs due to absolute advantages, whereby a specific country employs the most advanced production technology in a particular industry. Germany, recognised for its automotive and chemical sectors, exemplifies this concentration of expertise, although the global landscape has witnessed increasing expertise in Asia, particularly in the wake of electromobility regarding the automotive industry. However, the primary driver of the world's trade patterns is comparative advantage, as highlighted by Feenstra and Taylor (2014). While absolute advantage relates to a country's superior production capabilities in a specific good compared to other nations, comparative advantage arises when a country demonstrates superior efficiency in producing a good relative to its ability to produce other goods (Feenstra and Taylor, 2014).

The underlying concept can be effectively illustrated through David Ricardo's renowned example of trade between England and Portugal involving wine and cloth. Ricardo's example assumes that Portugal has an absolute advantage in producing both wine and cloth

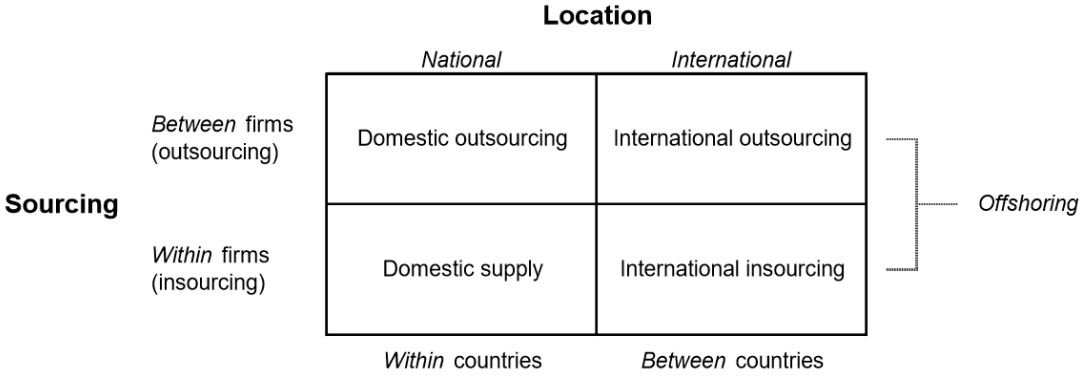
compared to England (Ricardo, 1817). However, England possesses lower opportunity costs in cloth production relative to Portugal, implying that England would need to sacrifice fewer units of wine to produce an additional unit of cloth compared to Portugal. As a result, England has a comparative advantage in cloth production, while Portugal has a comparative advantage in wine production. Consequently, Ricardo argues, England exports cloth to Portugal, while Portugal exports wine to England, aligning with their respective comparative advantages (Ricardo, 1817). This trade arrangement leads to mutual gains when the trade is balanced and both countries export goods based on their comparative advantage (Ricardo, 1817). This example highlights the significance of comparative advantage, whereby a country can possess a comparative advantage in producing a good, even if another country has an absolute advantage in the same good (Feenstra and Taylor, 2014). The principle that countries can benefit from trade by exporting goods in which they have a comparative advantage is a fundamental principle upheld by institutions like the United Nations (UN), the WTO, and the World Bank. Furthermore, it serves as the central explanation for the pattern of global trade (Feenstra and Taylor, 2014).

Having explored how the pattern of global trade can be attributed to advancements in transportation and ICT, as well as the economic mechanisms that render international trade advantageous, particularly comparative advantage, let us now turn our attention to the forms of sourcing employed by companies when organising their acquisition of intermediate inputs for production.

Firms face the decision of choosing between internal and external, as well as domestic and foreign sourcing, leading to four distinct forms of sourcing as illustrated in Figure 2.2. The classification of these forms is based on indicators proposed by Feenstra and Hansen (1996), although some scholars argue for a focus on offshore outsourcing (OECD, 2010). Domestic sourcing presents two options: domestic insourcing and domestic outsourcing. In domestic insourcing, a final-good producer internally supplies its components, often achieved through vertical integration. Domestic outsourcing, on the other hand, involves contracting with an external domestic supplier. When a final-good producer sources inputs from another country, it engages in foreign sourcing, which can take the form of international insourcing or international outsourcing. International insourcing mostly refers to a final-good producer owning a supplying company located abroad, known as FDI, while international outsourcing involves contracting with an external supplier located abroad.

These distinctions contribute to cross-border intra-firm trade, an important factor driving international trade in intermediate inputs. The precise definitions and variations of FDI are further discussed in the following section. Additionally, international outsourcing, also known as foreign outsourcing or offshore outsourcing, encompasses cross-border inter-firm trade. In practice, the categorisation of these sourcing forms is not always clear-cut, as companies may exercise control over their foreign suppliers to ensure quality even without ownership. Moreover, companies may combine multiple sourcing strategies, including both insourcing and outsourcing, and collaborate with specialised firms for certain intermediate inputs.

Figure 2.2: The four forms of sourcing



Source: Olsen (2006)

The subsequent sections of this chapter will delve into the prevalence of these organisational forms in theory and practice, undertake a comprehensive theoretical analysis of sourcing strategies, supplemented by empirical evidence from literature and insights from international trade data. The objective is to address the significance of offshoring service activities in both manufacturing and service industries, exploring its evolution over time and extracting valuable insights for theory, practice, and policy-making.

2.2 Offshoring

2.2.1 Definition and scope

While a universally accepted definition of offshoring does not exist, it can be described as the relocation, either wholly or partially, of manufacturing or service activities to foreign

locations (OECD, 2007). Industrial activities can be shifted to a foreign affiliate through FDI or to an external supplier via offshore outsourcing, with the ownership characteristic distinguishing the two forms. Offshoring primarily involves the trade of intermediate inputs rather than final goods, and the production of a final good often entails multiple border crossings for its components (Feenstra and Taylor, 2014). An intermediate good is defined as an input used in the production process that has undergone its own production and is consumed during this process (OECD, 2010).

More specifically, FDI flows encompass the monetary value of cross-border transactions associated with direct investments over a specific time-frame. These financial flows comprise various components, including equity transactions, reinvestment of earnings, and inter-company debt transactions. Outward flows refer to transactions that augment the investments made by investors in the reporting economy into enterprises situated in foreign economies. Conversely, inward flows represent transactions that boost the investments made by foreign investors in enterprises located in the reporting economy. These flows entail actions that increase the investments of foreign investors in resident enterprises. Conversely, they exclude transactions that decrease the investments made by foreign investors in resident enterprises.

Different perspectives exist in literature regarding whether offshoring encompasses both FDI and offshore outsourcing, which is the case for this dissertation. The term offshoring thus refers to a company's acquisition of intermediate inputs from abroad, regardless of the ownership of the supplying company. It is important to note that there exist specific variations that extend beyond the scope of this study. These include re-shoring, which involves the relocation of business activities back to the home country, and near-shoring, which entails the transfer of operations to countries in close geographical proximity. These alternative forms of offshoring have gained attention in recent years due to evolving economic and geopolitical factors including the discussed protectionist policy measures. However, given the specific focus and objectives of this dissertation, a comprehensive analysis of these variations is beyond its intended scope.

Let us establish a differentiated view on FDI as a basis for the subsequent analysis. FDI is a form of investment where a company establishes a long-term strategic relationship and exercises significant control in a foreign company (OECD, 2009). It can take different forms, such as vertical and horizontal FDI, each with its distinct characteristics.

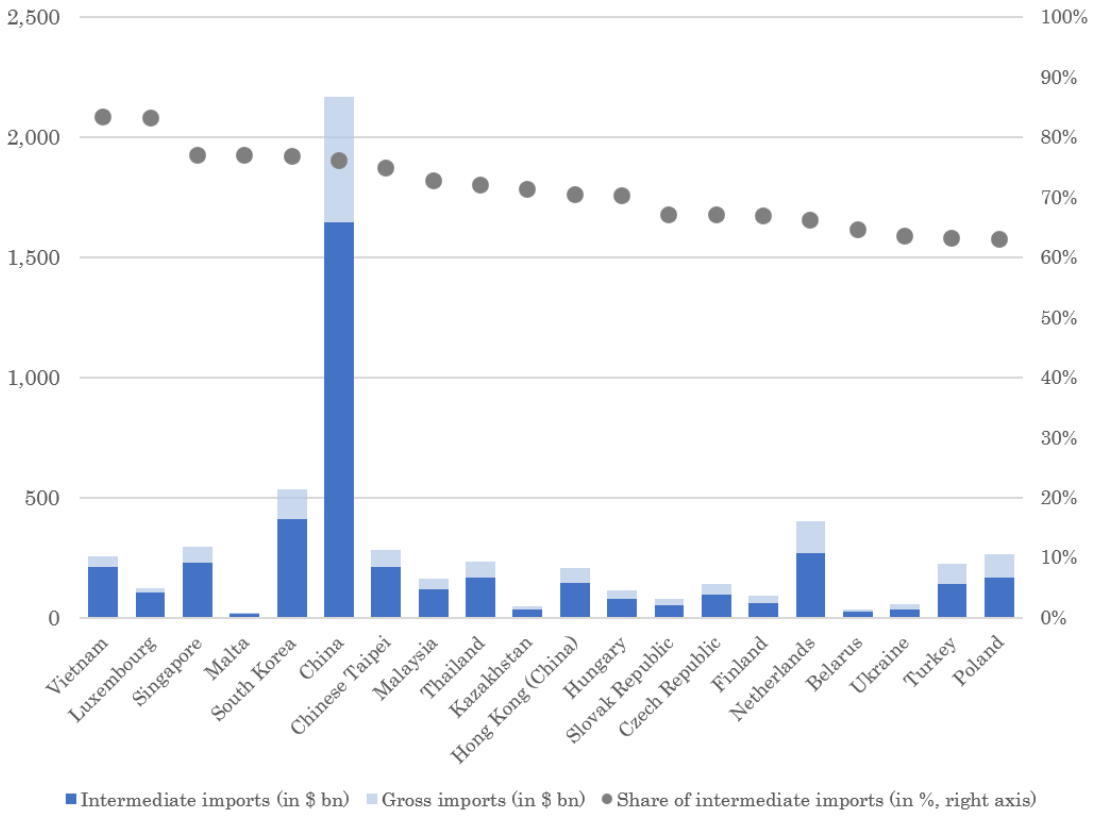
Vertical FDI involves the fragmentation of production across multiple countries, where the output from one facility becomes the input for another (De Backer and Yamano, 2012). This form of FDI is driven by the search for cost advantages, such as lower wage rates or the opportunity to avoid tariffs (Feenstra and Taylor, 2014). Moreover, vertical FDI constitutes the conventional view of offshoring, where advanced technology from industrialised countries is combined with lower-cost labour from developing nations. Today's pattern of world trade, however, deviates from this traditional view to a significant degree. As we will discuss in subsequent sections, international trade has evolved in a way that encompasses various forms of sourcing strategies and complex global supply chains, resulting in a more nuanced and diverse landscape of economic interactions. Additionally, the terms developing and industrialised used to describe countries' development stage are outdated as the differentiation into two groups of development is not representative of the present world. On the other hand, horizontal FDI focuses on duplicating or establishing production processes similarly in foreign locations, aiming to serve local markets and benefit from economies of scale (De Backer, Yamano, 2012). These different forms of FDI contribute to increased international trade, particularly in intermediate inputs, and shape the pattern of world trade (OECD, 2010). Additionally, FDI can be classified as either greenfield or brownfield investment, depending on whether a new facility is built or an existing one is acquired, respectively (Feenstra and Taylor, 2014). While these distinctions provide insights into the nature of FDI, it is important to acknowledge that real-world situations often involve hybrid forms and complex sourcing strategies that optimise supply chains (Lorz and Siebert, 2014). Furthermore, FDI can be viewed from the perspective of inward or outward investment, depending on whether the investment is made by non-residents in the reporting country or by residents in foreign countries (OECD, 2013). The understanding of these various dimensions of FDI contributes to a comprehensive analysis of international trade and investment flows.

The forthcoming section analyses today's landscape of offshoring in the global economy and its evolution over the last few decades, encompassing both FDI and offshore outsourcing. The purpose of this analysis is to offer a thorough examination of the current landscape of offshoring and provide insights into the key patterns and factors influencing its trajectory.

2.2.2 Picture of reality

Examples of internationally produced goods can illustrate patterns of world trade that have become possible due to the developments discussed in the previous sections and firms' willingness to source inputs globally. Referring to Tempest (1996), Feenstra (1998) depicts the renowned example of how Mattel engages in offshore-outsourcing to produce its most famous product, the Barbie doll. Approximately two dolls per second were sold at the time worldwide, which accounted for $1.4 bn of sales in 1995. Before the dolls were assembled in Indonesia, Malaysia and China, raw materials in the form of plastic and hair were imported from Taiwan and Japan while the molds and paints for decorating them were obtained from the USA. Besides labour for the assembly, China supplied cotton cloth used for the dolls' dresses. When leaving Hong Kong for the USA, the dolls were valued at $2, of which $0.35 covered Chinese labour, $0.65 covered the materials and the rest covered transportation and overhead. Of the $9.99 the dolls sold for in the USA, Mattel earned at least $1 (Tempest, 1996). The remainder covered transportation, marketing, retailing and related activities in the USA (Feenstra, 1998). Therefore, although the dolls were considered to be produced in Asia, most of the value-added came from activities performed in the USA. This illustrates that already two decades ago, a product-country link could not be generally assumed anymore, since final-good producers had internationalised (parts of) their supply chains and a product from one country could contain intermediate inputs from many others (Baldwin, 2011).

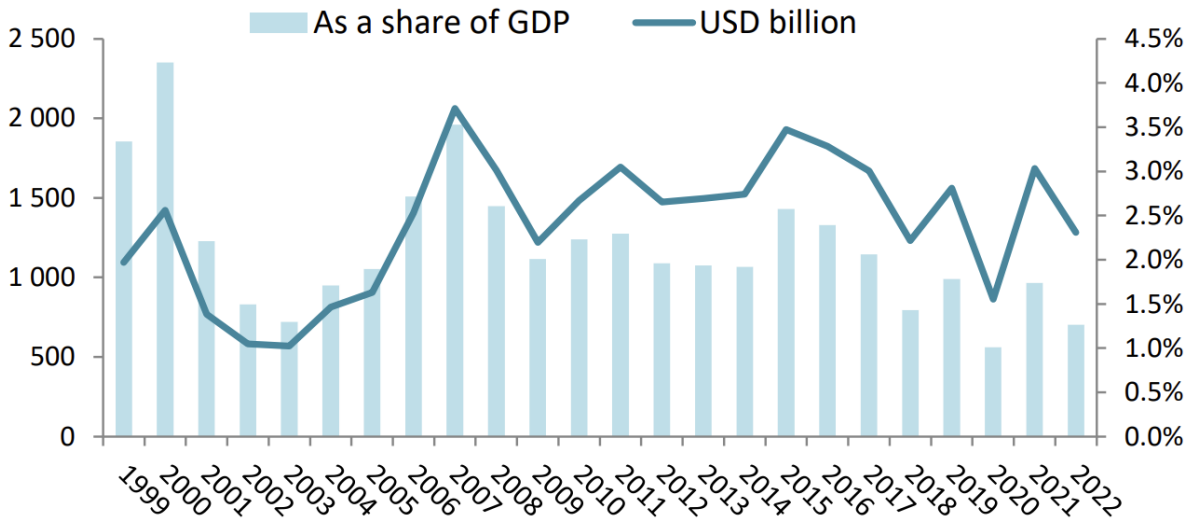
Figure 2.3: Intermediate imports as a share of gross imports by country, 2020



Source: Author's illustration based on OECD (2023a)

Let us examine the role of intermediate inputs in today's world economy and how this developed in recent decades. Figure 2.3 shows the absolute value of intermediate and gross imports in 2020 for those 20 countries with the highest share of intermediate inputs (see right axis). We see that many smaller countries observe high shares of intermediate inputs, owing to the fact that they are not able to build sophisticated supply chains in every industry themselves, as mentioned earlier. Besides the observation that this is true also for the large economy of China, we see its dominance in absolute terms with imports worth approximately $1,650 bn in 2020. Moreover, seven of the 10 countries with the highest share of intermediate imports are from Asia, illustrating the interconnectedness of their economies and GVCs. Moreover, the diagram depicts the fact that the small countries Luxembourg, Singapore and Hong Kong operate as trading hubs for large amounts of traded goods and services. The differentiation of manufacturing and services is discussed in Section 2.4.

Figure 2.4: Global FDI flows over time and as a share of GDP, 1999-2022



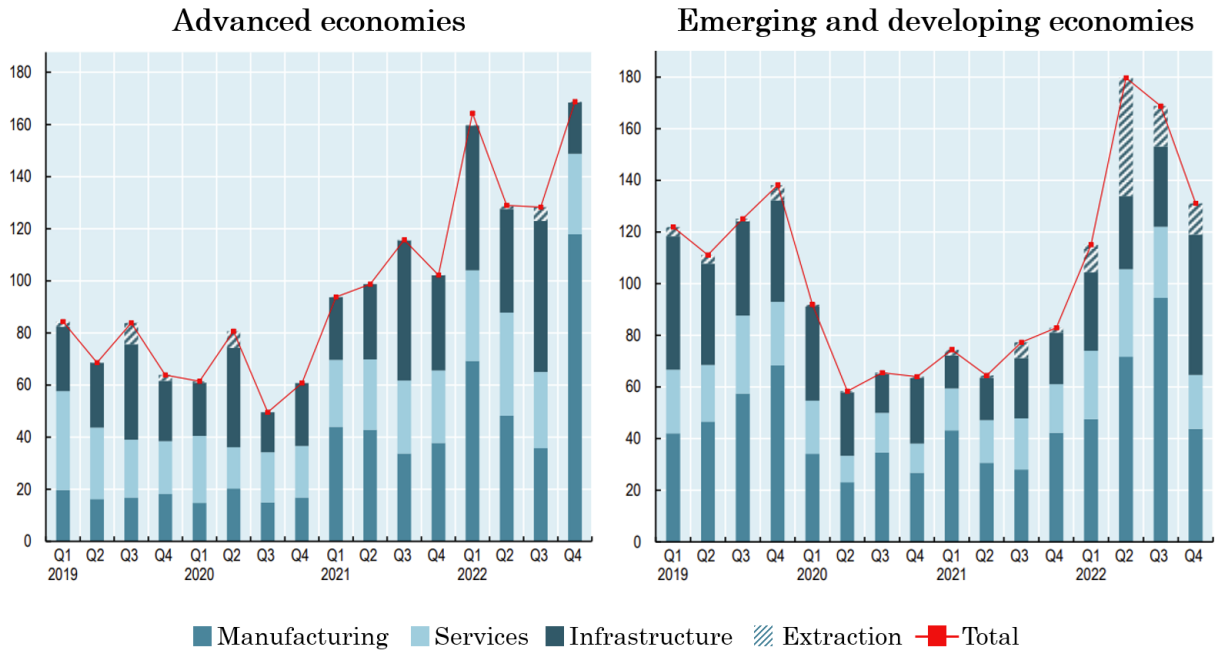
Source: OECD (2023b)

The global average of intermediate imports is 59.1 percent for 2020. This increased by three percentage points from 55.8 percent in the year 2000. In absolute terms, intermediate imports rose by a factor of 5.3, on average, over the same time (OECD, 2023a).

Let us turn to FDI specifically, looking at global FDI flows over time in Figure 2.4. The development shows significant fluctuations over time as we clearly see both the financial crisis starting in 2008 as well as the economic consequences of the COVID-19 pandemic. Most recently, increased flows of 2021 were followed by large withdrawals of investments resulting in FDI flows of $1,286 bn in 2022. These were mainly driven by capital disinvestments of a large MNE of the telecommunications sector in Luxembourg that shifted assets to other countries (OECD, 2023b). Without this effect global FDI flows reduced by five percent compared with 2021 as opposed to 24 percent, which shows how large the impact of one companies' operations can be on global flows of FDI. Nevertheless, also large recipients of FDI saw reductions in 2022, such as the USA an China, in parts due to less new investment projects (OECD, 2023b). Overall, however, the two largest world economies were the destination of the largest investment inflow.

When differentiating FDI flows by mergers and acquisitions (M&A) and greenfield investment projects, we see that M&A investments are made in advanced economies to approximately 90 percent (OECD, 2023b), whereas greenfield investments are balanced

Figure 2.5: Global FDI greenfield projects by sector, 2019-2022 (in $ bn)[1]

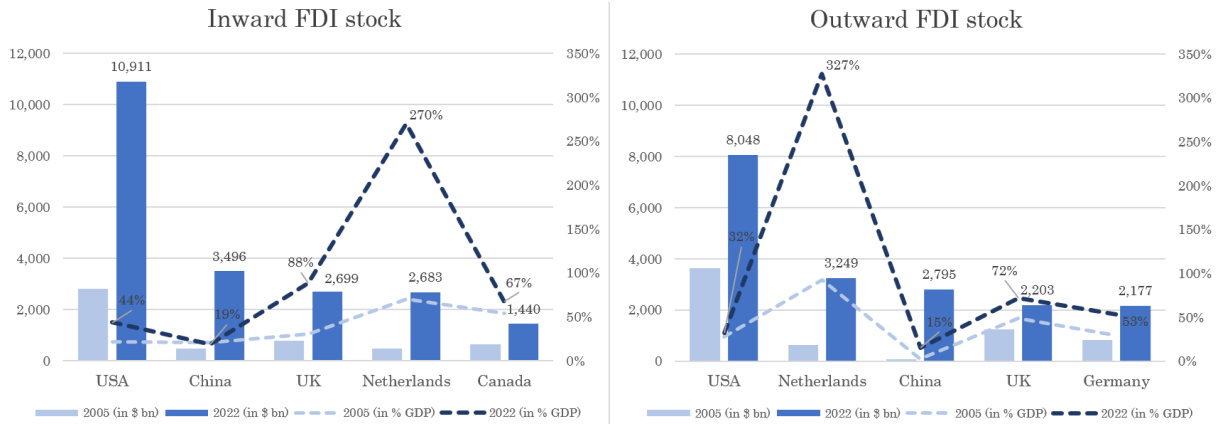


Source: OECD (2023b)

between relatively more and less developed economies. Figure 2.5 shows announced FDI greenfield projects of the recent past in the form of capital expenditures by sector. While overall FDI flows declined in 2022, greenfield projects increased in all sectors and by 44 percent in advanced economies and doubled in emerging and developing economies. Investors displayed significant interest in the economies of the USA, Egypt, the UK, India, and Australia, as these countries emerged as key targets for capital investment. Together, they accounted for a substantial portion of the total capital expenditure, comprising approximately 43 percent of the overall investment of this type (OECD, 2023b). Moreover, large investments were made in emerging and developing economies in the extraction sector. Exxon Mobil, a prominent USA-based company, made headlines with its significant investment announcement of $10 bn in Guyana. Likewise, Dragon Oil from the United Arab Emirates (UAE) unveiled plans for a substantial investment of $7.5 bn in Turkmenistan. Total Energies, another major player in the industry, outlined its intentions to invest $6.5 bn in Uganda. Furthermore, both Shell from the UK and Exxon Mobil from the USA disclosed substantial investment projects of $6.3 bn each in Qatar, solidifying their commitment to the region (OECD, 2023b).

[1]The terms "advanced economies" and "emerging and developing economies" follow the definition of the International Monetary Fund.

Figure 2.6: Inward and outward FDI stock by country, 2022[2]



Source: Author's illustration based on OECD (2023b)

Additionally, Figure 2.6 shows the largest five countries for inward and outward FDI stock, illustrating the large investment stock of the USA in other countries as well as the large investments in the USA and China.

GVCs and TiVA

Until recent years, our understanding of the world economy's integrated production structure was restricted and based on limited case studies, such as the example of Barbie dolls discussed. However, advancements in international trade data reporting and empirical evidence based on harmonised data sources have provided a more comprehensive view of GVCs (OECD, 2017). The fragmentation of production, as opposed to GVCs, focuses on activities directly associated with goods production, where production stages are split internationally to leverage potential cost reductions through differences in factor inputs across locations (De Backer and Yamano, 2012). Conventional international trade data sometimes create a misleading picture, as illustrated by the example of Barbie dolls (De Backer and Yamano, 2012). While the dolls may indicate "Made in China", a significant portion of the value-added does not originate from China, as discussed. This is due to the double-counting problem in international trade data, which includes the value of intermediate inputs at each border crossing, regardless of any previous crossings.

[2]Data for the Netherlands excludes Special Purpose Entities (SPEs), which are legal entities commonly used to hold specific assets and manage associated risks separately from their parent company, providing flexibility and efficiency in operations (OECD, 2023b). They play a vital role in corporate transactions, project financing, and other strategic initiatives, however, they typically have minimal physical presence or employment in the country where they are established.

This overstates the value of trade between countries. Official statistical systems, which measure gross transaction values, struggle to accurately capture a substantial portion of international production processes within value chains (OECD, 2017). To obtain a more accurate picture of reality, it is crucial to analyse value-added in trade and GVCs.

GVCs on the other hand, encompass the organisation of production, trade, and investments across different countries, taking into account motivations beyond cost reduction, such as market entry, customer proximity, and access to strategic resources and knowledge. They also consider the explicit role of services in international production, leading to a more precise explanation of recent world trade patterns (OECD, 2017). GVC activities stand out from purely domestic production and consumption, as well as traditional international trade, by the value-added characteristic. Value-added is created across national borders through the flow of intermediate inputs in GVC activities (OECD, 2017). Depending on whether goods cross one or multiple borders, GVC activities can be categorised as simple or complex (Wang et al., 2017).

An important rationale for studying GVCs is their potential to enhance productivity and facilitate knowledge spill-over, thereby fostering economic growth (Wang, Wei, Yu and Zhu, 2017). Participation in GVCs enables countries to engage in a specialised division of labour and focus on activities that align with their comparative advantages. One key advantage of GVCs is that they provide developing countries with the opportunity to join existing supply chains, allowing them to benefit from a more specialised division of labour without having to build entire supply chains domestically. This aspect has played a significant role in the growth success of countries like South Korea and Taiwan, which could leverage GVCs, particularly those originating from the advanced manufacturing economy of Japan, instead of having to establish complex domestic supply chains (Baldwin, 2012). Furthermore, participation in GVCs can lead to job creation, technology transfers, and knowledge spill-over effects, providing additional benefits to participating economies (OECD, 2017). However, it is important to note that although GVCs facilitate trade, the depth of meaningful participation may vary. For instance, while South Korea, Taiwan or also China and other Asian economies had been able to import intermediate goods from neighbouring economies, contributing to their economic growth, Brazil has faced limitations in joining GVCs due to its geographic location, thus relying more on domestic inputs for its production (Baldwin, 2011). The structure of GVCs can result in less interconnectedness among participating industries within a country, leading to a lower

domestic value-added and a potentially less sophisticated domestic economy (Baldwin, 2011). It is worth noting that participation in GVCs does not automatically guarantee benefits for all countries. However, for relatively less developed nations, participation in GVCs can offer opportunities for trade and contribute to productivity gains and knowledge spill-over, thereby benefiting both individual economies and the global economy as a whole.

TiVA data addresses the limitations of conventional trade measures by capturing the value that each country adds to a good or service (De Backer and Yamano, 2012). TiVA indicators are derived from international input-output tables, which capture the value of imported intermediate goods and services (OECD, 2010). These tables depict the use of one industry's output as an input by another industry, classifying intermediate inputs based on their use as either final demand or inputs to other industries' production. Unlike conventional methods such as the UN's Broad Economic Categories (BEC) classification scheme, input-output tables also provide information on inputs in service sectors, enabling the analysis of service offshoring (OECD, 2010). Another meaningful metric in this regard is unit labour cost, which is the ratio of average wages to GDP per capita. Other costs in the production process, such as trade costs due to geographical distance, can offset the gains from low wages (OECD, 2017). Countries that observe higher labour productivity have higher wages but can be low-cost producers at the same time, which their unit labour costs illustrate.

Despite the advantages of TiVA data and recent measures of vertical specialisation, there are some shortcomings to consider. Most countries apply the proportionality assumption in calculating their import matrices, assuming that the use of imported intermediate inputs is proportional to an industry's total use of those inputs (De Backer and Yamano, 2012). However, studies have questioned the accuracy of this assumption, highlighting variations in the use of imported inputs across different production types (see e.g. Koopman, Wang and Wei, 2008). Additionally, while the new measures provide more accurate insights into the structures and dynamics of trade between countries, they do not distinguish between FDI and offshore-outsourcing.

The shares of domestic and foreign value-added in exports indicate the extent to which countries are tied into GVCs (Feenstra, 2017). Foreign value-added in exports (FVAiX) is an indicator of backward linkage trade in the sense that, moving backward from consumers, it illustrates the supply structure of domestic and foreign value-added to produce exports and thus shows the dependence on foreign inputs. By contrast, forward linkages analyse

the dependence of domestic intermediate inputs, which is exported, on foreign production to reach consumers, in that sense looking forward to consumers.

Figure 2.7 shows the import content of exports, the FVAiX, differentiated for the geographical origin of value-added. We clearly see that, as discussed earlier, the extent of offshoring activities is influenced by the size of a country as the geographically larger countries USA, China, India, Australia and Brazil tend to have more domestic trade compared to smaller countries. Canada constitutes an exception in this regard, influenced by it sharing the longest international border in the world of more than 8,000 kilometres with the USA. There is a general pattern observable that countries trade more with economies closer to them, although the economically larger a country, the more balanced its FVAiX, as illustrated by USA, Japan and to a lesser extent Germany. Also among European countries, a significant portion of their imported content in exports originates from other European countries. This trend is also observed in other European nations not depicted in this illustration. However, Ireland stands out with substantial linkages to the North America, primarily due to the significant presence of MNEs based in the USA.

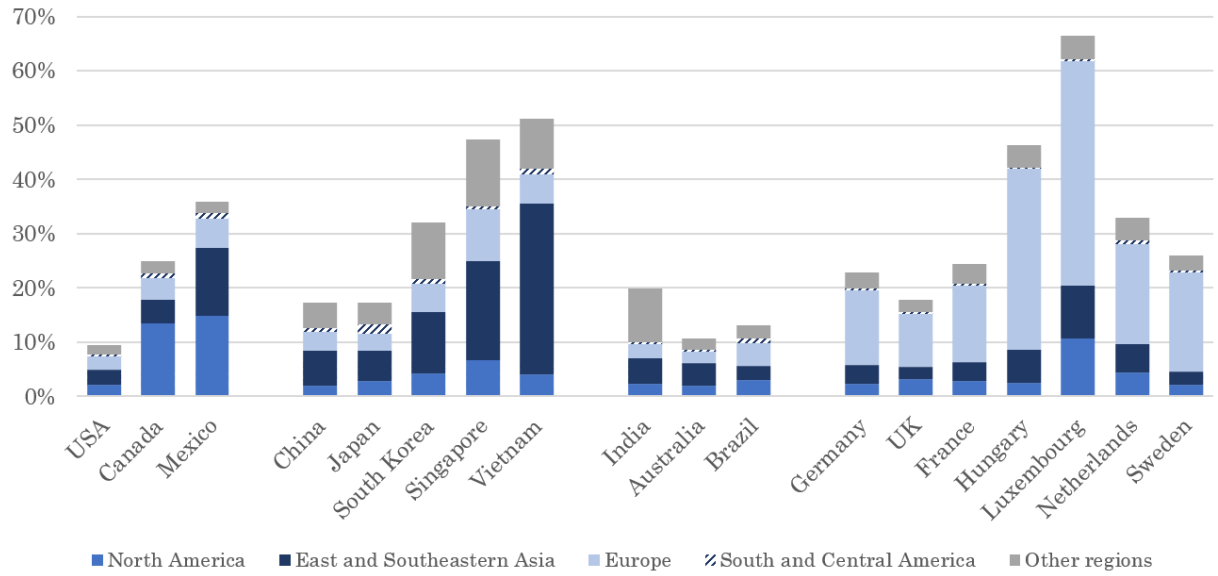
While the past decades have brought a decline in transportation and travel costs, the opportunity cost of time remains constant (Baldwin, 2011). This has influenced companies to opt for closer locations for their sources of intermediate inputs into production (Baldwin, 2011). This is well established by Tinbergen's gravity equation of trade, based on Newton's law of gravity, suggesting that the economic size or proximity of two countries positively correlates with the volume of trade between them.

Also the geographical distribution of offshoring is primarily determined by the significance of distance and trade costs in vertical trade. This relationship highlights the connection between trade, investment, and services, which encourages MNEs to establish foreign affiliates in geographically proximate countries. The subsequent analysis of service offshoring in particular is going to shed more light on this.

Furthermore, the discussed pattern of offshoring underscores that it predominantly occurs between developed countries within the North America, Europe, and East Asia regions. Consequently, the traditional perspective of offshoring, whereby industrialised economies source intermediate inputs from so-called developing nations, does not reflect the current state of offshoring in the global economy. Relatively less developed economies still

[3]Countries are excluded in their respective region to result in FVAiX. See Appendix A for the countries contained in the regions.

Figure 2.7: Foreign value-added in exports (FVAiX), by region, 2022 (in %)[3]



Source: Author's illustration based on OECD (2023b)

face limited access to the world economy, however, with a significant portion of their international trade taking place within the closest network of GVCs.

2.2.3 Reasons and impediments

Given the established knowledge on offshoring, it is pertinent to explore additional factors that influence the offshoring patterns observed in the world economy that have not been a sufficient part of the discussion so far. This section aims to discuss these interconnected factors that have shaped the global economy before establishing the sourcing strategy model and delving deeper into the topic of service offshoring in the subsequent section.

Distance and trade costs have long been crucial determinants of both trade and offshoring. These factors play a central role in explaining the geographical distribution of offshoring and how changes in trade costs impact the volume, nature, and destination of offshoring activities. While tariffs have historically been significant trade costs, contemporary trade agreements, such as the United States-Mexico-Canada Agreement (USMCA) and RCEP, along with international organisations like the OECD (Organisation for Economic Cooperation and Development) and WTO, have substantially reduced tariff-related costs. As a result, non-tariff trade costs have gained prominence in today's context. These costs can be tangible, such as transportation fees and insurance, or intangible, including licensing,

regulatory requirements, and contract-related issues. In industries with complex GVCs, non-tariff trade costs are more than four times higher than tariff-related costs (OECD, 2017). Given the multiple border crossings and mostly the involvement of multiple companies in the production process of complex GVCs, these goods are contract-intensive, leading to higher trade costs, particularly due to the increased risk of contract non-performance. Economies with robust institutional frameworks and those without neighbouring countries with weak institutions tend to engage more extensively in GVCs, all else being equal (OECD, 2017).

Factor-price disparities across regions are a crucial determinant of offshoring activities. Natural resources, such as oil and gas, for instance, contribute significantly to inter-regional trade of intermediates, with North Africa and the Middle East exporting to Asia. Wages also play a role, specifically through unit labour costs, which have a considerable influence on countries' participation in GVCs, particularly for relatively less developed nations that serve as attractive offshoring destinations. Various factors affect trade costs and productivity, ultimately determining an economy's unit labour costs and the competitiveness of its companies. These factors encompass institutional quality, human capital, educational systems, workforce qualifications, fluctuations of wage and workforce, infrastructure, inflation, and other related aspects. They impact an economy's productivity and, influence the attractiveness of offshoring activities, particularly in the context of FDI. Consequently, these factors shape the participation of economies in GVCs and the global economy, offering potential gains in productivity and knowledge spillovers that can drive economic growth. Many of these factors can be influenced positively or negatively through government policies, highlighting the role of governments in this context (OECD, 2017).

The discussed concept of comparative advantage serves as a fundamental explanation for the patterns observed in world trade and offshoring. Through GVCs, countries can engage in specialised international division of labour and exploit their comparative advantages. However, the emergence of GVCs has changed the motivations behind offshoring activities. Nowadays, in addition to seeking cost advantages, MNEs engage in offshoring to enter new markets, gain proximity to customers, and access strategic resources and specific knowledge. Additionally, certain industries concentrate the majority of knowledge and human capital in specific geographic locations, further driving the need for trade and offshoring activities.

At the firm level, MNEs involved in labour-intensive production of final goods may choose to offshore specific stages of the production process to locations with lower unit labour costs. Having multiple foreign component suppliers can benefit final-good producers by reducing vulnerability to economic crises or natural disasters in particular regions. Dunning's Eclectic Paradigm emphasises three types of advantages that drive offshoring: ownership, locational, and internationalisation advantages. Ownership advantages stem from firm-specific comparative advantages such as technological knowledge, patented products, and brand reputation, which incentivise firms to capitalise on them internationally. Locational advantages refer to the benefits of operating in specific locations, including favourable tax regulations, tariff avoidance, subsidies, access to specific resources, proximity to target markets, or low unit labour costs. Internationalisation advantages explain why the international division of labour occurs within organisations through FDI or arm's-length relationships via offshore-outsourcing. MNEs can leverage comparative advantages by sourcing intermediate inputs from external suppliers abroad or licensing technology to foreign companies, thus benefiting from their suppliers' economies of scale.

Contracts that govern the relationship between final goods producers and their intermediate input suppliers, in the context of FDI or offshore-outsourcing, can be incomplete and give rise to economic challenges that limit the fragmentation of production. Information asymmetries between contracting parties and related incentives for opportunistic behaviour contribute to these challenges. Independent suppliers may be motivated to provide lower-quality intermediate inputs to cut costs, while licensees of specific technologies may misuse licensed knowledge to produce competing products. In the automotive industry, for example, a vehicle-manufacturer might demand re-negotiations after a supplier has made significant investments in a manufacturing plant, creating uncertainty. Such factors can hinder offshore-outsourcing and lead MNEs to opt for FDI instead. FDI mitigates the hold-up problem associated with insufficient incentives to invest in contractual relationships through the distribution of property rights. However, it is worth noting that similar challenges can arise within organisations where contracts exist between different entities, potentially giving rise to hold-up problems (Lorz and Siebert, 2014). The decision to engage in FDI or offshore-outsourcing depends on the presence and extent of internationalisation advantages.

The following section provides a detailed theoretical analysis of the sourcing strategy decision before the subsequent section discusses service offshoring in detail.

2.3 Sourcing strategy model

This section employs the renowned model of global sourcing developed by Antràs and Helpman (2004) to analyse the decision-making process of companies in selecting between the four forms of sourcing discussed in the previous section.

The objective of the sourcing strategy is to exploit the comparative advantages of both companies and their suppliers. However, determining where to source intermediate inputs from and whether to engage with internal or external suppliers involves various economic challenges, such as trade and transaction costs, incomplete contracts, and the establishment of relationships between companies. These challenges are examined within the framework of the firms' sourcing strategy model.

The theoretical model provides insights into the endogenous organisational choices related to the ownership structure and the location of intermediate input production based on differences in technology and productivity (Antràs and Helpman, 2004). It builds upon the analysis of within-sector heterogeneity by Melitz (2003), who finds that low-productivity firms primarily serve the domestic market, while high-productivity companies engage in some form of offshoring (Melitz, 2003). Furthermore, the model draws upon the firm structure presented in Antràs (2003). Companies face the challenge of incomplete contracts in both forms of offshoring, whereas FDI provides well-defined property rights (Antràs and Helpman, 2004).

The model incorporates two inputs: the supply of headquarters services and the quality and quantity of intermediate inputs. The final-good producer controls the former input, while the latter is controlled by its internal or external supplier. This framework enables an examination of the influence of within-sector variations in productivity, as well as technological and organisational differences across sectors, on international trade, FDI, and firms' organisational choices. The relative intensity of these two inputs plays a crucial role in determining firms' sourcing strategy decisions (Antràs and Helpman, 2004).

The model is built upon a global scenario consisting of two countries, referred to as North and South. Final-good producers are located in North, while suppliers of intermediate inputs are present in both countries. The firms' sorting pattern within industries depends on their productivity, leading them to either engage in one of the four forms of sourcing or exit the industry. In industries observing low intensity of headquarter services, firms do

not pursue vertical integration. Low-productivity firms source their inputs domestically from the North, whereas high-productivity firms import inputs from South. In industries with high intensity of headquarter services, all four forms of sourcing coexist and are in equilibrium. Low-productivity firms opt for domestic outsourcing, while high-productivity firms outsource to South, following a similar pattern as in low-intensity sectors. Additionally, among final-good producers sourcing inputs domestically, low-productivity firms outsource, while high-productivity firms engage in vertical integration. As a result, the least-productive final-good producers domestically outsource the production of intermediates, while the most productive ones engage in FDI (Antràs and Helpman, 2004).

The equilibrium organisational structure is determined by the incentives arising from differences in organisations, fixed costs, and wages between North and South. The prevalence of different forms of sourcing depends on various cross-country disparities, including wage gaps, trade costs, productivity dispersion within sectors, ownership advantages, the distribution of bargaining power, and the intensity of headquarter services (Antràs and Helpman, 2004). The model predicts that sectors with higher productivity dispersion or lower headquarter intensity tend to have a higher proportion of final-good producers engaged in offshoring. Conversely, high-intensity sectors with greater productivity dispersion witness a higher degree of vertical integration among final-good producers. As a result, these sectors exhibit a larger share of intra-firm trade compared to arm's-length trade (Antràs and Helpman, 2004).

The subsequent part of this section (2.3) draws upon the model framework and analysis presented in Antràs and Helpman (2004).

2.3.1 The model

In the model of North and South, the sole factor of production is labour. Within this world, there exists a homogeneous group of consumers, represented by a unit measure, who share identical preferences denoted by

$$U = x_0 + \frac{1}{\mu}\sum_{j=1}^{J} X_j^{\mu}, \qquad 0 < \mu < 1,$$

with consumption of a homogenous good x_0, an index of aggregate consumption X_j in sector j and the parameter μ. The substitution function of the consumption of $x_j(i)$ is

given by

$$X_j \;=\; \left[\int x_j(i)^{\alpha}\mathrm{d}i\right]^{1/\alpha}, \qquad 0<\alpha<1,$$

This represents the consumption of different varieties, with an endogenously determined range of i. The substitution function's constant elasticity is aggregate consumption in sector j, while the elasticity of substitution among two varieties in a given sector is $1/(1-\alpha)$. As we assume $\alpha > \mu$, varieties within a sector can be substituted by one another more easily than for x_0 or varieties from another sector. Because α and μ are identical across both countries, it becomes more convenient to direct attention towards variations in technology and organisational costs across sectors. This approach allows to examine how these differences interact with organisational choices and impact industrial structure, trade patterns and FDI. The inverse demand function for each variety i in sector j is denoted by

$$p_j(i) \;=\; X_j^{\mu-\alpha} x_j(i)^{\alpha-1}. \tag{1}$$

Both countries provide producers of differentiated products with labour supply that is perfectly elastic and the fixed wage rates are given by w^N for North and w^S for South, with $w^N > w^S$. Furthermore, the productivity of labour in country l is w^l, with $l = N, S$ for North and South, respectively. Labour supply is assumed to be large enough for every country to produce x_0.

Final-good varieties can be produced in North only. Before production, a firm encounters fixed costs of entry in the form of f_E units of Northern labour. With its productivity level θ from a known distribution $G(\theta)$ the firm either decides to start production or to withdraw from the market. If the firm decides to initiate production, it encounters an additional fixed cost associated with organising the production process. This cost is a function of the firm's ownership structure and the location of production. The production of final-good varieties requires a combination of variety-specific inputs of headquarter services $h_j(i)$ and manufactured components $m_j(i)$. The resulting output is denoted by the sector-specific Cobb-Douglas function

$$x_j(i) \;=\; \theta\left[\frac{h_j(i)}{\eta_j}\right]^{\eta_j}\left[\frac{m_j(i)}{1-\eta_j}\right]^{1-\eta_j}, \qquad 0<\eta_j<1, \tag{2}$$

with the firm-specific parameter θ and the sector-specific parameter η_j. Analogous to final-good varieties, headquarter services $h_j(i)$ can be produced in North only. Intermediate inputs $m_j(i)$, by contrast, can be produced in both North and South. The production of one unit of output requires one unit of labour, which is equal in both North and South as well as for both inputs.

There are two types of agents, namely final-good producers H who supply headquarter services in North and operators of manufacturing plants M who supply intermediate inputs in either North or South. For the required supply of intermediate inputs, every H contracts with an M. The model allows for international production fragmentation based on the forms of global sourcing from the previous section, as M can be located in both countries.

With these assumptions, the final-good producers locate themselves in North. A final-good producer denoted as H faces the fixed cost of entry $w^N f_E$ to initiate the production of final-good varieties. The producer also observes the productivity level denoted by θ. Given these factors, the firm has the option to either insource or outsource its intermediate inputs and can enter into contracts with either an internal or external component supplier denoted as M.

Total management costs associated with the production of intermediate and final goods are influenced by the firm's choice of organisational form and the supplier's location. These costs include fixed organisational expenses such as accounting, marketing, supervision, and quality control. They are denominated in terms of Northern labour and represented by $w^N f_k^l$, where k is an index representing the ownership structure and l is an index representing the country of the supplier M. The ownership structure k can take the form of vertical integration (V) or outsourcing (O) with $k \in \{V, O\}$, indicating whether the firm integrates vertically or outsources its intermediate inputs. As mentioned earlier, the supplier M can be located in the North (N) or the South (S), thereby determining the firm's specific organisational form.

The fixed organisational costs are higher when M is located in South due to higher costs of communication and monitoring in the foreign country. Thus, $f_k^S > f_V^N$ and $f_k^S > f_O^N$ for $k = V, O$. Additionally, a V firm is associated with higher fixed organisational costs than an O firm and therefore, $f_V^l > f_O^l$ for $l = N, S$. It follows that the fixed organisational

costs of the four forms of sourcing are ranked as

$$f_V^S > f_O^S > f_V^N > f_O^N. \tag{3}$$

Several constraints exist within the contracting environment of the firms, as both the final-good producer H and the component supplier M are unable to establish enforceable contracts ex ante regarding specific combinations of intermediate inputs and their prices. They are also unable to specify the amounts of hired labour or the sales revenue derived from the final products in such contracts. As a result, H and M engage in bargaining over the surplus generated after the production of intermediate inputs. This bargaining process is modelled as a generalised Nash bargaining game. In this game, H receives a fraction $\beta \in (0, 1)$ of the ex post gains from the relationship with M, regardless of the form of sourcing.

The specific organisational form chosen by H and M influences the distribution of surplus, as it affects H's outside option in the bargaining process. If H owns M, H has the option to fire M and take possession of the inputs $m_j(i)$. However, under outsourcing, both parties are left without income if M is fired. It is assumed that firing M results in a loss of $1-\delta^l$ of the final-good production, as H is not as effective in utilising the intermediate inputs without the cooperation of M. If these costs were not present, H would always have the incentive to fire M and take possession of the inputs in the ex post stage. However, this would imply that M had the incentive to choose $m_j(i) = 0$ ex ante, leading to $x_j(i) = 0$, whereby H and M would never engage in vertical integration from the beginning.

Furthermore, the assumption $\delta^N \geq \delta^S$ is applied in order to generate higher costs associated with a contractual breach if M is located in South, reflecting the differences between North and South in terms of legal protection and corruption levels.

The final-good producer H makes a decision ex ante to choose the organisational form and, consequently, the location of M in order to maximise its profits. It is assumed that both countries have an infinitely elastic supply of M agents. H offers a contract to M that includes an up-front participation fee, which can be either positive or negative. This means that the final-good producer can either pay the manufacturing plant operator to participate in the relationship or receive payment from M.

Due to the infinitely elastic supply of M agents, the profit of M from the relationship with H in the equilibrium equals its ex ante outside option, taking into account the participation

fee. For the sake of simplicity, M's ex ante outside option is assumed to be zero in both the North and the South.

2.3.2 Equilibrium

Concerning the payoffs for H and M resulting from the bargaining game in sector j, if the parties reach an agreement, the potential revenue from the final goods sold on the market are given by $R(i) = p(i)x(i)$. According to equations (1) and (2), we can rewrite this as

$$R(i) \;=\; X^{\mu-\alpha}\theta^{\alpha}\left[\frac{h(i)}{\eta}\right]^{\alpha\eta}\left[\frac{m(i)}{1-\eta}\right]^{\alpha(1-\eta)}. \tag{4}$$

As we analyse a specific sector, we exclude the index j in the following. As discussed, if H and M fail to reach an agreement the outside option of M is zero while that of H is dependent on M's ownership structure and location. Moreover, if H decides to engage in domestic or foreign outsourcing for the production of its components, it's outside option is also equal to zero. Hence, final-good producer H receives $\beta R(i)$ and manufacturing plant operator M receives $(1-\beta)R(i)$. Consequently, under vertical integration H has more leverage. If H and M engage in vertical integration but are unable to reach an agreement, H is able to sell $\delta^l x(i)$ of output as M is located in country l. This results in $(\delta^l)^\alpha R(i)$ revenue and in $[(\delta^l)^\alpha]R(i)$ ex post gains from trade. Final-good producer H receives $(\delta^l)^\alpha R(i) + \beta[1-(\delta^l)^\alpha]R(i)$ from the bargaining game. This consists of its outside option and the fraction β of the quasi rents. M obtains $(1-\beta)[1-(\delta^l)^\alpha]R(i)$ and payoffs are proportional to revenue. $\beta_k^l R(i)$ as the payoff of H, k as the ownership structure and l as the location of M combined with the assumption $\delta^N \geq \delta^S$ imply that

$$\beta_V^N \;=\; (\delta^N)^\alpha + \beta[1-(\delta^N)^\alpha] \geq\; \beta_V^S$$

$$=\; (\delta^S)^\alpha + \beta[1-(\delta^S)^\alpha] > \beta_O^N \;=\; \beta_O^S \;=\; \beta. \tag{5}$$

The distribution of revenue between H and M differs depending on whether the production of intermediate inputs is vertically integrated or outsourced. As discussed, when vertical integration occurs, the final-good producer H is able to seize the inputs, resulting in a larger share of the revenue, in particular when integration takes place in the North. Since

H and M cannot sign enforceable contracts on the delivery of inputs ($h(i)$ and $m(i)$) ex ante, each party chooses its quantity independently to maximise its own payoff. Specifically, H selects the amount of headquarter services ($h(i)$) that maximises $\beta_k^l R(i) - w^N h(i)$, while M chooses the quantity of components ($m(i)$) that maximises $(1-\beta_k^l)R(i) - w^l m(i)$. Using equation (4), the first-order conditions of these two expressions yield the profit function that represents the total value of the relationship between H and M. The profit function can be expressed as follows:

$$\pi_k^l(\theta, X, \eta) \;=\; X^{(\mu-\alpha)/(1-\alpha)} \theta^{\alpha/(1-\alpha)} \psi_k^l(\eta) - w^N f_k^l, \tag{6}$$

where

$$\psi_k^l(\eta) \;=\; \frac{1-\alpha[\beta_k^l \eta + (1-\beta_k^l)(1-\eta)]}{\{(1/\alpha)(w^N/\beta_k^l)^{\eta}[w^l/(1-\beta_k^l)]^{1-\eta}\}^{\alpha/(1-\alpha)}}. \tag{7}$$

The first parameter of the profit function $\pi_k^l(\theta, X, \eta)$, the productivity level θ, is firm-specific, whereas the other two are industry-specific. η measures the industry's intensity of headquarter services and the consumption index X is endogenous to the industry and exogenous to H. As discussed, the assumptions imply that the final-good producer H chooses the ownership structure and its component supplier's location such that its profit function is maximised.

To understand these properties, let us recall that before H and M form a relationship, H offers M a contract that includes a participation fee $t \gtrless 0$. In addition, H expects operating profits $\pi_{Hk}^l = \beta_k^l R(i) + t - w^N h(i) - w^N f_{Hk}^l$, where f_{Hk}^l is the fixed cost component it encounters together with the ownership structure k and the location l of M. Analogously, M expects operating profits $\pi_{Mk}^l = (1-\beta_k^l)R(i) - t - w^l m(i) - w^N f_{Mk}^l$, where f_{Mk}^l is the fixed cost component it needs to invest. Regarding the components of the fixed costs that H and M face, $f_{Hk}^l + f_{Mk}^l = f_k^l$. H is incentivised to set the participation fee t as high as possible, provided that the constraint $\pi_{Mk}^l \geq 0$ is satisfied, as t has no further influence once H and M form a relationship. In equilibrium, therefore, the value of t satisfies $\pi_{Mk}^l = 0$. This implies that $\pi_{Hk}^l = R(i) - w^N h(i) - w^l m(i) - w^N f_k^l$, yielding $\pi_{Hk}^l = \pi_k^l(\theta, X, \eta)$ for a subgame-perfect equilibrium. Depending on the productivity level θ of H, it either chooses the ownership structure and the location of M that maximise (6) or withdraws from the market and thus loses the fixed cost of entry $w^N f_E$. H opts for the latter when θ is below a threshold value of $\underline{\theta} \in (0, \infty)$. For this threshold productivity

level, the operating profits

$$\pi(\theta, X, \eta) \;=\; \max_{k\in\{V,O\},l\in\{N,S\}} \quad \pi_k^l(\theta, X, \eta) \tag{8}$$

are equal to zero. Moreover, $\underline{\theta}$ is implicitly defined by

$$\pi(\underline{\theta}, X, \eta) \;=\; 0 \tag{9}$$

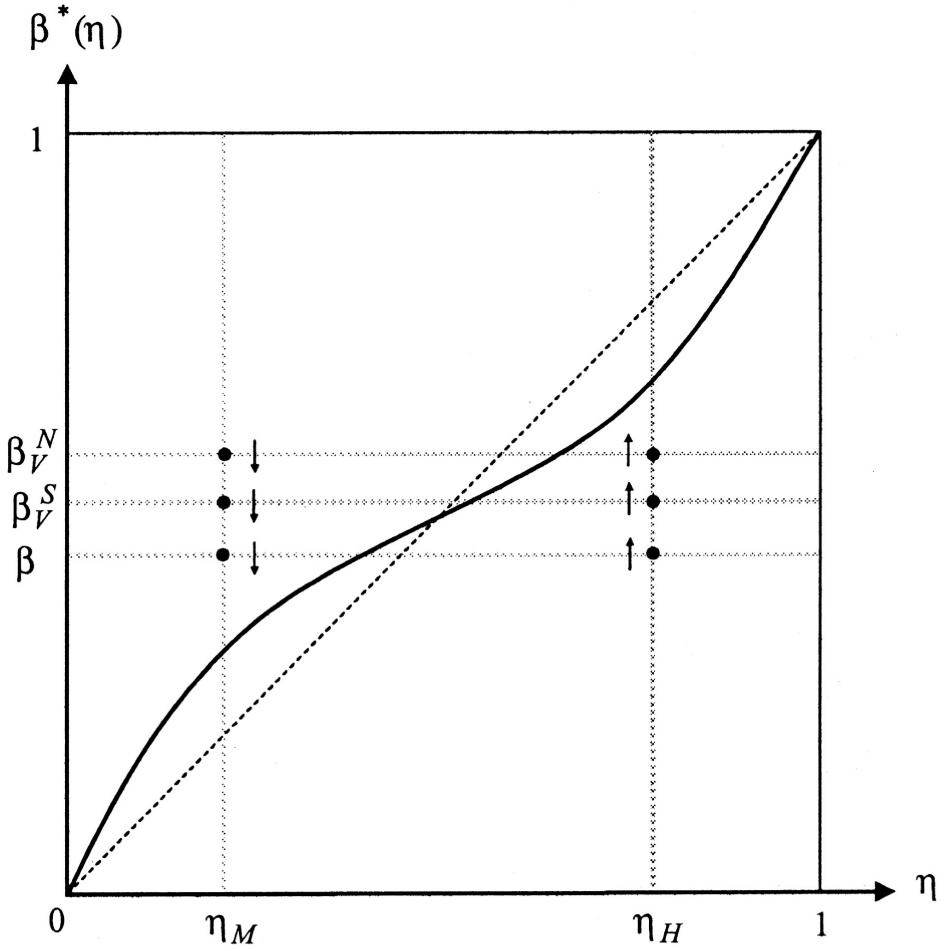
and depends on X, which is the industry's aggregate consumption index, whereby $\underline{\theta}(X)$. Now to solve the maximisation problem depicted on the right hand side of (8), H effectively chooses (β_k^l, w^l, f_k^l), such that equation (6) is maximised. Because $\pi_k^l(\theta, X, \eta)$ is declining in w^l and f_k^l, H prefers to minimise both variable and fixed cost components in organising production. With regard to variable costs, South is preferred to North as the location for the manufacturing plant operator, irrespective of the ownership structure, because $w^N > w^S$. Regarding fixed costs, profit levels rank in reverse order in comparison to (3). If the final-good producer could freely choose its revenue share β_k^l, it would choose $\beta^* \in [0, 1]$, maximising $\psi_k^l(\eta)$. In fact, this fraction is denoted by

$$\beta^*(\eta) \;=\; \frac{\eta(\alpha\eta + 1 - \alpha) - \sqrt{\eta(1-\eta)(1-\alpha\eta)(\alpha\eta + 1 - \alpha)}}{2\eta - 1}. \tag{10}$$

A higher fraction of revenue β_k^l for final-good producer H, however, is associated with a lower fraction for M and therefore, causes a lower level of component production. This in turn induces a lower revenue level.

Figure 2.8 shows the distribution of revenue maximising joint profits. The function $\beta^*(\eta)$ is depicted as the solid curve increasing in η and is independent of factor prices and less non-linear for a higher α, with $\beta^*(0) = 0$ and $\beta^*(1) = 1$. To understand this phenomenon, it is important to recognise that neither H nor M fully captures the marginal returns from their respective investments in the ex post bargaining process. As a result, both parties have an incentive to underinvest in the provision of headquarter services and intermediate inputs. The extent of underinvestment is inversely proportional to the revenue share obtained by each party. Therefore, it is necessary to allocate a larger fraction of the revenue to the party that makes the more significant investment ex ante. For instance, when the intensity of headquarter services η is higher, the final-good producer's revenue share β^* will also be higher. This relationship highlights the importance of aligning investment

Figure 2.8: Distribution of revenue-maximising joint profits



Source: Antràs and Helpman (2004)

incentives with revenue distribution.

Final-good producer H is unable to choose the division rule of the surplus freely ex ante and is restricted to choose the ownership structure and the location of component production, which corresponds to β_k^l in the set $\{\beta_N^V, \beta_O^N, \beta_V^S, \beta_O^S\}$, which affects the division rule. Profits are higher for larger values of β_k^l whenever the intensity of headquarter services is close to one. Together with equation (5), this indicates that, in case there are no other variations in terms of advantages and disadvantages among the different organisational forms, H would have opted for domestic integration. Nonetheless, when the intensity of headquarter services approaches zero, profits are greater for lower values of β_k^l, and H would have selected outsourcing in the absence of such differences between the organisational forms. However, other distinctions in costs and benefits do exist, and the final-good producer's choice of k and l, which maximises its profits, relies on its level of productivity.

In equilibrium, the operating profits an agent expects are equal to the fixed costs component of market entry. In conjunction with their respective productivity level, agents either choose to withdraw from the industry when it is below $\underline{\theta}(X)$, as this implies negative expected operating profits, or they decide to enter the industry when it is above or equal to that level, such that $\theta \geq \underline{\theta}(X)$. Agents that enter the industry choose organisational forms that maximise their profits. Accordingly, the free-entry condition can be expressed as

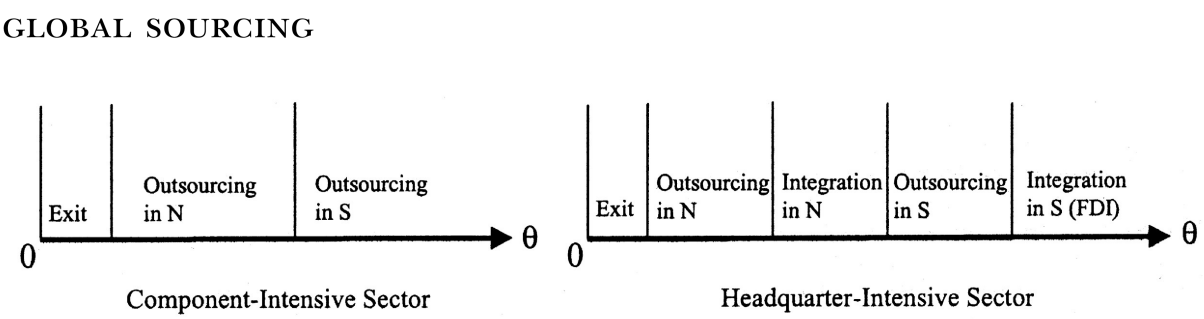
$$\int_{\underline{\theta}(X)}^{\infty} \pi(\theta, X, \eta) dG(\theta) \; = \; w^N f_E. \tag{11}$$

Furthermore, this condition provides an implicit solution for the industry's real consumption index X. This index serves as a key parameter for calculating various other significant variables, including the organisational forms of final-good producers and the threshold productivity level required for entry into the sector.

2.3.3 Organisational forms

A final-good producer faces various trade-offs when deciding on the organisational form. When considering the location decision, South has higher fixed costs but lower variable costs compared to North. In terms of the organisational structure decision, integration leads to higher fixed costs but provides the final-good producer (H) with a larger revenue share. While this increases H's incentive to provide headquarter services, it also incentivises a reduction in the supply of components by M. Consequently, integration can potentially result in a lower revenue level and, consequently, lower profits for H. To simplify the

Figure 2.9: Organisational forms



Source: Antràs and Helpman (2004)

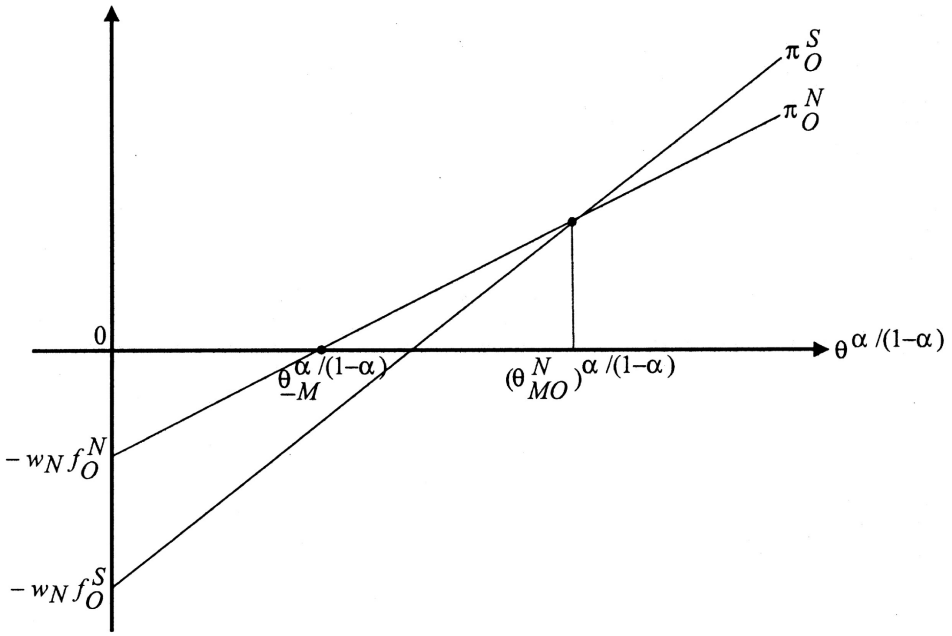
analysis, this section focuses on sectors with either high or low headquarter intensity. Figure 2.9 illustrates how firms sort into different organisational forms based on the sector's headquarter intensity and the productivity levels of the firms. The left portion of the figure demonstrates that in sectors with a high component intensity but low headquarter intensity, firms entering the industry are divided into two organisational forms. Firms do not integrate, and high-productivity entrants outsource the production of intermediate inputs to South, while low-productivity entrants engage in domestic outsourcing in North.

In sectors with a high intensity of headquarter services, the least productive firms withdraw from the industry, while those with slightly higher productivity levels choose to outsource their production in North, following the pattern of component-intensive sectors. Furthermore, even more productive firms opt for integration in North, while the most productive firms source their intermediate inputs from South, of which the relatively less productive firms engage in outsourcing while the relatively more productive firms engage in vertical FDI. Hence, in headquarter-intensive sectors, less productive firms generally rely on acquiring their components from North, while more productive firms obtain them from South. These findings will be further explained in the subsequent analysis.

At first, let us consider a component-intensive sector such that $\beta^*(\eta) < \beta_O^N = \beta_O^S = \beta$. Figure 2.8 illustrates this with $\eta, =, \eta_M$. The arrows depict the direction in which profits are affected by changes in β_k^l. In this sector, the profit function $\pi_k^l(\cdot)$ is declining in β_k^l because of lower fixed costs and a reduced revenue share for H in the case of outsourcing compared with integration. Given the lower fixed costs associated with outsourcing and the lower revenue share for H, the preferred choice in both countries is outsourcing rather than integration. When deciding whether to outsource domestically or in South, H faces a trade-off between the lower variable costs of component production in South and the lower fixed organisational costs in the North. The equilibrium outcome depends on the relative differences in wage rates and fixed organisational costs between North and South. In the equilibrium, H either outsources in both countries or only in South, depending on the specific relationship between these factors. Following the framework established by Antràs and Helpman (2004), the benchmark case focuses on the equilibrium where outsourcing occurs in both countries. This case serves as a basis for the subsequent analysis.

Figure 2.10 displays the equilibrium in the component-intensive sector for which the difference of the wage rate between North and South is small compared with that of the fixed organisational cost.

Figure 2.10: Equilibrium in the component-intensive sector



Source: Antràs and Helpman (2004)

It follows that $w^N/w^S < (f_O^S/f_O^N)^{(1-\alpha)/\alpha(1-\eta)}$. The productivity variable $\theta^{\alpha/(1-\alpha)}$ is denoted by the horizontal axis while the operating profits are given by the vertical axis. Equation (6) yields that the operating profit function $\pi_k^l(\cdot)$ has the intercept $-w^N f_k^l$ and is linear in $\theta^{\alpha/(1-\alpha)}$. Moreover, the function's slope is proportional to $\psi_k^l(\eta)$. We see that the profit line π_O^S is steeper than the profit line π_O^N due to lower wages in South. Firms with a productivity level below $\underline{\theta}_M$ face negative operating profits and consequently exit the market. Firms with a productivity level between $\underline{\theta}_M$ and $\underline{\theta}_{MO}^N$ receive the highest profits by outsourcing in North, while firms with a productivity level above $\underline{\theta}_{MO}^N$ by outsourcing in South. The threshold values for $\underline{\theta}_M$ and $\underline{\theta}_{MO}^N$ are given by

$$\underline{\theta}_M = X^{(\alpha-\mu)/\alpha}\left[\frac{w^N f_O^N}{\psi_O^N(\eta)}\right]^{(1-\alpha)/\alpha},$$

$$\theta_{MO}^N = X^{(\alpha-\mu)/\alpha}\left[\frac{w^N(f_O^S - f_O^N)}{\psi_O^S(\eta) - \psi_O^N(\eta)}\right]^{(1-\alpha)/\alpha}. \tag{12}$$

From the free-entry condition (11) along with (6) and (8) is follows that

$$w^N X^{(\alpha-\mu)/(1-\alpha)} = \frac{\psi_O^N(\eta)[V(\theta_{MO}^N) - V(\underline{\theta}_M)] + \psi_O^S(\eta)[V(\infty) - V(\theta_{MO}^N)]}{f_E + f_O^N[G(\theta_{MO}^N) - G(\underline{\theta}_M)] + f_O^S[1 - G(\theta_{MO}^N)]}, \tag{13}$$

where

$$V(\theta) = \int_0^\theta y^{\alpha/(1-\alpha)} dG(y).$$

Furthermore, the equations (12) and (13) give implicit solutions for the aggregate consumption index X as well as the threshold values $\underline{\theta}_M$ and $\underline{\theta}_{MO}^N$.

Let us consider a sector that is headquarter-intensive with $\beta^*(\eta) > \beta_V^N$. Figure 2.8 illustrates this by $\eta = \eta_H$. The arrows imply that profits are increasing in β_k^l. A sector of this kind has a high marginal product of headquarter services, whereby underinvesting in headquarter services h is particularly costly, which makes integration favourable. This can be seen by the slopes of the profit lines in Figure 2.11, where π_V^l is steeper than π_O^l since $\psi_V^l(\eta) > \psi_O^l(\eta)$.

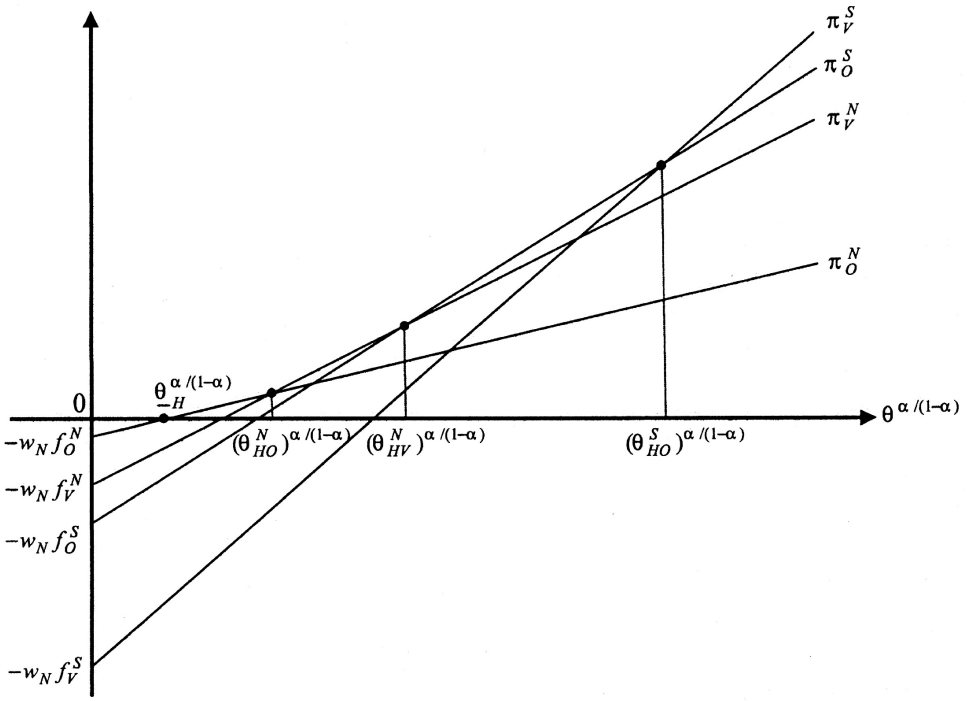
The slopes of the profit lines π_V^N and π_O^S provide two options. On the one hand, π_V^N should be steeper as the final-good producer receives a larger revenue share in the integration scenario. One the other hand, with lower variable production costs in South π_O^S ought to be steeper, which is the exemplary illustration in Figure 2.11. Consequently, the sector's cross-country differentials of the wage rate together with the fixed organisational costs decide whether the profit line of integration in North or outsourcing in South is steeper. Let us examine both outcomes.

Firstly, we consider a large wage rate differential compared with the difference between β_V^N and β. Since $\psi_O^S(\eta)$ is larger than $\psi_V^N(\eta)$ in this case, it follows that

$$\psi_V^S(\eta) > \psi_O^S(\eta) > \psi_V^N(\eta) > \psi_O^N(\eta). \tag{14}$$

This is shown in Figure 2.11 and is in line with the benchmark case of this analysis, as the equilibrium entails all of the four organisational forms discussed. Those firms with a

Figure 2.11: Equilibrium in the headquarter-intensive sector



Source: Antràs and Helpman (2004)

productivity level below $\underline{\theta}_H$ exit the industry, those with a productivity level between $\underline{\theta}_H$ and θ_{HO}^N outsource in North, while firms observing a productivity level between θ_{HO}^N and θ_{HV}^N engage in domestic vertical integration. Those with a productivity level between θ_{HV}^N and θ_{HO}^S outsource in South and those firms with a productivity level above θ_{HO}^S engage in vertical integration in South.

The threshold values for $\underline{\theta}_H, \theta_{HO}^N, \theta_{HV}^N$ and θ_{HO}^S are denoted by

$$\underline{\theta}_H = X^{(\alpha-\mu)/\alpha}\left[\frac{w^N f_O^N}{\psi_O^N(\eta)}\right]^{(1-\alpha)/\alpha},$$

$$\theta_{HO}^N = X^{(\alpha-\mu)/\alpha}\left[\frac{w^N (f_V^N - f_O^N)}{\psi_V^N(\eta) - \psi_O^N(\eta)}\right]^{(1-\alpha)/\alpha},$$

$$\theta_{HV}^N = X^{(\alpha-\mu)/\alpha}\left[\frac{w^N (f_O^S - f_V^N)}{\psi_O^S(\eta) - \psi_V^N(\eta)}\right]^{(1-\alpha)/\alpha},$$

$$\theta_{HO}^{S} \;=\; X^{(\alpha-\mu)/\alpha}\left[\frac{w^{N}(f_{V}^{S}-f_{O}^{S})}{\psi_{V}^{S}(\eta)-\psi_{O}^{S}(\eta)}\right]^{(1-\alpha)/\alpha}. \tag{15}$$

With the free-entry condition given by (11) we could derive an equation analogous to (13). Moreover, together with (15) we could then solve this equation for both the threshold values and the sector's aggregate consumption index X.

Secondly, let us examine the case with a small wage differential, where the headquarter-intensive sector yields $(w^{N}/w^{S})^{1-\eta} < \phi(\beta_{V}^{N},\eta)/\phi(\beta\,\eta)$. In this scenario, π_{V}^{N} is larger than π_{O}^{S}, contradicting the ordering given in (14). The two resulting possibilities of ordering are $\psi_{V}^{S}(\eta) > \psi_{V}^{N}(\eta) > \psi_{O}^{S}(\eta) > \psi_{O}^{N}(\eta)$ as well as $\psi_{V}^{N}(\eta) > \psi_{V}^{S}(\eta) > \psi_{O}^{S}(\eta) > \psi_{O}^{N}(\eta)$. The former implies a profit line π_{V}^{N} with a higher intercept and a steeper slope than π_{O}^{S}. Final-good producers' choice of integration in North therefore dominates that of outsourcing in South, which does not exist in this specific scenario. In the latter scenario, integration in North dominates both organisational forms of international trade in intermediates and firms entering the industry sort into either outsourcing or integration in North, with the more productive firms engaging in vertical integration. So far the analysis builds on the assumption of the ordering of the fixed costs of equation (3). Abandoning this assumption and assuming the fixed organisational costs of integration to be higher than those of outsourcing implies different implications regarding organisational forms as well as firms' sorting patterns. Irrespective of this ordering, more firms decide to integrate in headquarter-intensive sectors and, concerning the benchmark cases, the organisational forms in equilibrium follow the patterns depicted in Figure 2.9.

2.3.4 Prevalence of organisational forms

The discussed model predicts the spread of organisational forms across firms and industries. While Section 2.3.3 examined differences of this prevalence on firm-level, this section analyses variations on industry-level. Antrás and Helpman (2004) follow Helpman, Melitz and Yeaple (2004) and define $G(\theta)$ as a Pareto distribution with shape z, where

$$G(\theta) \;=\; 1-\left(\frac{b}{\theta}^{z}\right) \qquad for\ \theta \geq b > 0, \tag{16}$$

with z being large enough to guarantee that the size distribution of firms has a finite variance. The analysis in this section concentrates on the benchmark cases regarding both

component-intensive and headquarter-intensive sectors.

Firstly, let us consider a component-intensive sector. As discussed for the benchmark case illustrated by Figure 2.10, firms with a lower productivity level than $\underline{\theta}_M$ exit the industry, those firms with a productivity level between $\underline{\theta}_M$ and θ_{MO}^N outsource in North, whereas those observing a productivity above θ_{MO}^N outsource abroad while no firm integrates. The fraction of firms engaging in outsourcing in country l is given by σ_{MO}^l, where $\sigma_{MO}^S = [1-G(\theta_{MO}^N)]/[1-G(\underline{\theta}_M)]$ and $\sigma_{MO}^N = 1-\sigma_{MO}^S$. Together with the Pareto distribution given by (16), this implies that $\sigma_{MO}^S = (\underline{\theta}_M/\theta_{MO}^N)^z$. By inserting (12), this yields

$$\sigma_{MO}^S = \left[\frac{\psi_O^S(\eta)-\psi_O^N(\eta)}{\psi_O^N(\eta)}\frac{f_O^N}{f_O^S-f_O^N}\right]^{z(1-\alpha)/\alpha}. \tag{17}$$

Concerning the relative prevalence of the two outsourcing types it is sufficient to analyse the parameters' effect on these ratios, since σ_{MO}^S is a function of the ratios of slopes $\psi_O^S(\eta)/\psi_O^N(\eta)$ and of fixed costs f_O^S/f_O^N only.

In respect of the wage rate in South, a lower wage rate raises the profitability of Southern outsourcing and thus, the ratio $\psi_O^S(\eta)/\psi_O^N(\eta)$. This in turn increases the prevalence of this organisational form, such that σ_{MO}^S rises. In addition, the sector's equilibrium is raised by $\underline{\theta}_M$ and, hence, a lower wage rate in South yields a larger share of firms exiting the industry. Declining transportation costs for intermediate inputs have similar consequences. If the dispersion of productivity rises in the sector, more firms outsource in South. This is given by the expression in brackets in (17), representing the ratio of the threshold values $\underline{\theta}_M/\theta_{MO}^N$, together with a decline in z.

Regarding the relative intensity of components in the sector, a higher headquarter concentration leads to a diminished significance of components in the production process, consequently reducing the prevalence of outsourcing in South. As a result, the potential cost savings from foreign outsourcing become less relevant compared to the impact of elevated fixed organisational costs in South.

Secondly, let us consider a headquarter-intensive sector, which is characterised by the prevalence of all four organisational forms in its benchmark equilibrium. The sorting pattern of firms is decided by their productivity level, as shown by Figures 2.9 and 2.10. Those firms opting for the organisational form (k, l) is given by σ_{Hk}^l, with k representing the firm's ownership structure while M' location is denoted by l. The Pareto distribution

from equation (16) together with the threshold values from (15) yield the fractions

$$\sigma_{HO}^{N} = 1 - \left[\frac{\psi_V^N(\eta)-\psi_O^N(\eta)}{\psi_O^N(\eta)}\frac{f_O^N}{f_V^N-f_O^N}\right]^{z(1-\alpha)/\alpha},$$

$$\sigma_{HV}^{N} = \left[\frac{\psi_V^N(\eta)-\psi_O^N(\eta)}{\psi_O^N(\eta)}\frac{f_O^N}{f_V^N-f_O^N}\right]^{z(1-\alpha)/\alpha} - \left[\frac{\psi_O^S(\eta)-\psi_V^N(\eta)}{\psi_O^N(\eta)}\frac{f_O^N}{f_O^S-f_V^N}\right]^{z(1-\alpha)/\alpha},$$

$$\sigma_{HO}^{S} = \left[\frac{\psi_O^S(\eta)-\psi_V^N(\eta)}{\psi_O^N(\eta)}\frac{f_O^N}{f_O^S-f_V^N}\right]^{z(1-\alpha)/\alpha} - \left[\frac{\psi_V^S(\eta)-\psi_O^S(\eta)}{\psi_O^N(\eta)}\frac{f_O^N}{f_V^S-f_O^S}\right]^{z(1-\alpha)/\alpha},$$

$$\sigma_{HV}^{S} = \left[\frac{\psi_V^S(\eta)-\psi_O^S(\eta)}{\psi_O^N(\eta)}\frac{f_O^N}{f_V^S-f_O^S}\right]^{z(1-\alpha)/\alpha}. \tag{18}$$

Firstly, let us consider a fall in the wage rate of South. As discussed, a lower wage rate increases the profitability of sourcing intermediates from South for the final-good producer. Using (7), in this scenario, $\psi_V^S(\eta)$ and $\psi_O^S(\eta)$ rise while $\psi_V^N(\eta)$ and $\psi_O^N(\eta)$ remain unchanged. Taking equation (18), the fraction of firms engaging in outsourcing in North σ_{HO}^N does not change, while the share of firms integrating in North σ_{HV}^N falls. Slight changes in the profitability of foreign sourcing do not make this economical for firms outsourcing in North, as their productivity remains too low. However, for firms engaging in integration in North, a modest decline of the wage rate in South can be sufficient to make them source intermediates from South. Therefore, the fraction σ_{HV}^N declines and σ_{HO}^S rises. This becomes evident through equation (18), for which the ratio $\psi_V^S(\eta)/\psi_O^S(\eta)$ does not depend on the wage rate. When foreign sourcing becomes more attractive through a decline in South's wage rate, both σ_{HV}^S, the share of firms engaging in Southern vertical integration, as well as σ_{HO}^S, the share of firms engaging in foreign outsourcing, increase. The latter group of firms is predicted to be more prevalent by the model. Furthermore, a fall in transportation costs has the same effect as a decline in the labour costs of South.

Secondly, let us consider a fall in z, which is equal to a rise in the sector's productivity dispersion. If z declines, the fraction of final-good producers engaging in Northern outsourcing falls, the share of firms integrating in South rises, while the effect on the other

two organisational forms is ambiguous. In any case, the share of firms engaging in foreign sourcing rises. Moreover, the prevalence of FDI in South compared with outsourcing, denoted by the ratio $\sigma_{HV}^S/\sigma_{HO}^S$, as well as the prevalence of Northern integration compared to outsourcing, given by the ratio $\sigma_{HV}^N/\sigma_{HO}^N$, increase.

Thirdly, let us consider a changing intensity of headquarter services. If the headquarter-intensity increases, more final-good producers prefer domestic outsourcing to foreign outsourcing and, in general, prefer integration to outsourcing. Correspondingly, the ratios $\psi_O^N(\eta)/\psi_O^S(\eta)$ and $\psi_V^l(\eta)/\psi_O^l(\eta)$ are higher for larger values of η. Combined with equation (18), this causes a reduction in the share of firms outsourcing in North and an increase in the share of firms integrating in North. In addition, the sum of the two fractions rises, showing that a rise in an industry's headquarter-intensity η reduces the share of firms engaging in foreign sourcing. FDI is preferred to foreign outsourcing as the ratio $\sigma_{HV}^S/\sigma_{HO}^S$ increases and, consequently, σ_{HO}^S declines. This is in line with the findings from Antràs (2003), who analysed a panel of 23 manufacturing sectors in the USA for the years 1987, 1989, 1992, and 1994. The results show that a higher intensity of activities related to R&D in an industry is associated with a higher fraction of intra-firm imports in total imports (Antràs, 2003).

In addition, let us consider the revenue shares β_V^l. If the legal system in South improves or corruption declines, this causes the revenue share β_V^S to rise, which in turn raises the slope of the profit line π_V^S, whereas the others remain unaffected. In this scenario, both fractions of domestic as well as foreign sourcing do not change while there is a shift from Southern outsourcing to FDI. If the revenue share β_V^N increases, however, making integration in North more profitable, the profit line π_V^N becomes steeper. Together with (18), this implies a declining share of final-good producers outsourcing in North, a rising fraction of firms integrating in North, while the share of firms engaging in foreign outsourcing falls and that of firms engaging in FDI remains unchanged. Consequently, a shift towards integration in North changes the prevalence of the two forms of foreign sourcing in favour of FDI.

Furthermore, let us consider the parameter β that represents the bargaining power. An increase in β lets the ratios $\psi_V^S(\eta)/\psi_O^l(\eta)$, $\psi_V^N(\eta)/\psi_O^l(\eta)$ and $\psi_V^N(\eta)/\psi_V^S(\eta)$ fall. Since an increase in β is equivalent to a rise in bargaining power of H, outsourcing becomes more attractive compared with integration. Thus, in both countries, the fraction of firms outsourcing increases while that of firms integrating reduces. Moreover, the change in favour of Southern outsourcing is larger in absolute terms than the fall in the share of firms

engaging in FDI. Therefore, the fraction of firms engaging in foreign sourcing increases as the bargaining power of the final-good producer rises.

2.3.5 Economic problems

Regarding the contracting environment between final-good producers and their suppliers of intermediate inputs, the issue of incomplete contracts gives rise to hold-up problems, leading to suboptimal investments by both parties. Irrespective of the final-good producer's chosen organisational form, both producers and suppliers of intermediates engage in relationship-specific investments that are constrained by the incomplete nature of contracts. Unable to establish enforceable agreements ex ante, the parties bargain over surplus distribution after the production of intermediate inputs, resulting in suboptimal relationship-specific investments due to their anticipations of such bargaining behaviour. To mitigate the efficiency loss caused by the hold-up problem, firms can influence their sourcing strategy decisions. As previously mentioned in the context of Dunning's (1977) Eclectic Paradigm in Section 2.2, the sourcing decision depends on ownership and locational advantages, as well as internationalisation advantages, which determine whether MNEs prefer FDI or offshore outsourcing. FDI, by altering property rights, can potentially reduce the hold-up problem. However, vertical integration does not entirely eliminate this issue, as contracts exist between entities within an MNE.

In practical terms, a solution to this challenge is achieved by operating the internal supplier as a cost-centre. Under this approach, the supplier lacks the incentive to negotiate, as its end-of-fiscal-year result must be zero, and any surplus is directed to the MNE's headquarters.

MNEs involved in the production of technology-intensive goods are presumed to be more susceptible to the hold-up problem, particularly in cases where the technology produced is still at a low level of maturity (Antràs, 2005). The degree of capital intensity within an industry is closely related to the hold-up problem, resulting in a preference for vertical integration over offshore-outsourcing in capital-intensive sectors, while labour-intensive goods are typically traded through arm's-length relationships (Antràs, 2003). The incentives that prompt MNEs to operate in high-wage locations can shed light on their decision to opt for FDI rather than offshore-outsourcing when establishing production in low-wage countries (Antràs, 2005). One such motive is the concern that technology

transfers could compromise the firms' competitive advantages by potentially exposing firm-specific knowledge to the open market. This apprehension underpins their choice to engage in FDI instead, safeguarding proprietary expertise and potential comparative advantage.

Kohler and Smolka (2014) present compelling empirical evidence supporting the findings of the sourcing strategy model through their analysis of panel data from 2006 to 2011, focusing on firms within the Spanish manufacturing sector. Notably, their research highlights that the most productive firms are those that adopt sourcing strategies involving vertical integration and foreign sourcing (Kohler and Smolka, 2014). Additionally, they discover that firms initially not engaged in FDI or offshore-outsourcing but subsequently adopt one of these two forms during the examined period demonstrate higher productivity levels compared to others. A similar pattern is observed for domestic vertical integration. These findings validate the sourcing strategy model's premise, which posits a fixed cost disadvantage of foreign sourcing in comparison to domestic sourcing and vertical integration in relation to outsourcing (Kohler and Smolka, 2014). The study further reveals that, on average, firms employ more than one of the four sourcing strategies. Particularly, larger firms with over 200 employees tend to use a higher number of strategies compared to smaller firms with 10 to 200 employees. Moreover, the more productive firms tend to adopt multiple organisational forms (Olsen, 2006).

Schwarz and Suedekum (2014) contribute to the discussion by developing a model that predicts firms' organisational forms and the global scale and complexity of their production processes in a contracting environment where contracts are incomplete. Unlike the model presented by Antràs and Helpman (2004), this model allows final-good producers to contract with multiple suppliers of intermediate inputs. Apart from suggesting that firms opt for more than one form of sourcing, the model demonstrates that firms also make decisions concerning the share of offshoring and outsourcing among their suppliers, leading to asymmetries between them (Schwarz and Suedekum, 2014). Firms employ such hybrid sourcing strategies, combining internal and external suppliers, to influence internal revenue distribution, the bargaining power of involved parties, as well as their incentives for investing in the relationship (Schwarz and Suedekum, 2014).

Building on the established discussion on offshoring and the theoretical analysis of the sourcing strategy decision the following section analyses how companies in the service industry engage in one of the two forms of foreign sourcing before examining consequences

and policy implications of service offshoring subsequently.

2.4 Service offshoring

Service offshoring refers to the relocation of service activities from the domestic economy to foreign countries, involving the international sourcing of inputs (Lanz and Maurer, 2015). Similar to the offshoring of goods, service offshoring can take the form of internal suppliers through FDI or independent suppliers through offshore outsourcing. It is a sourcing strategy employed in both service networks and manufacturing value chains (Lanz and Maurer, 2015). Various forms of service offshoring can be identified.

2.4.1 Differentiations

The traditional distinction between offshored activities and those performed domestically is typically based on the skill-intensity of the tasks, with low-skilled activities being offshored and higher-skilled activities remaining in the domestic economy (Feenstra and Taylor, 2014). This division leads to an increase in the average skill-intensity of activities in both countries involved, as lower skilled tasks from the home country are offshored and for the foreign country these are, on average, higher skilled tasks (Feenstra and Taylor, 2014). However, service offshoring challenges this traditional division due to the higher skill-intensity of the offshored activities. Nevertheless, within the realm of service offshoring, there is still a distinction between low-skilled and high-skilled tasks, with the former typically being offshored to countries with lower wages or unit labour costs, while the latter are performed domestically (Blinder, 2006).

Service offshoring encompasses various types of activities. Examples of low-skilled service tasks include contact centres and other customer service occupations, which were among the first service activities to be offshored to relatively less developed countries like India due to lower wages and labour costs (Smith, 2006). On the other hand, high-skilled activities that are offshored include tasks such as data manipulation, software development, accounting and finance, banking services, analysis of medical test results, as well as R&D and product design in manufacturing industries. The extent to which these skill-intensive activities are offshored depends on their transferability and the ability of economies with lower wages or unit labour costs to provide such services (Craig and Gunn, 2010). For

service offshoring to yield trade gains, it is crucial that electronic delivery of these services can be achieved with minimal or no deterioration in quality (Craig and Gunn, 2010). Given the advancements in ICT, the traditional division of service activities may not fully capture the pattern of service offshoring in today's world economy.

A fundamental difference exists between personally delivered and impersonally delivered service activities. Personally delivered services involve the simultaneous production and consumption of the service, requiring face-to-face interaction between the service provider and consumer, such as hairdressing or plumbing services (Craig and Gunn, 2010). On the other hand, impersonal services can be delivered electronically, decoupling the production and consumption processes. Hence, the distinction between personal and impersonal service tasks appears more relevant in determining the ability of offshoring activities compared with the conventional view of offshoring. However, this distinction does not always serve as a clear dividing line, as there are intermediate cases. Certain skill-intensive personal services, like the growing phenomenon of medical tourism, demonstrate that such activities can be offshored despite the need for face-to-face interaction (Craig and Gunn, 2010).

Service activities can also be classified based on the industry in which they are performed, either in the service or manufacturing sector. Activities such as R&D, product design, maintenance and support, and technical engineering services are essential in the manufacturing of goods, either as integral parts of the production process or as value-added services for customers (Miroudot and Cadestin, 2017). With the increasing international fragmentation of production and the rise of GVCs, the significance of services in the manufacturing industry has grown, including areas like logistics (Lanz and Maurer, 2015). While call centre activities and other relatively low-skilled services have been offshored for many years, the offshoring of more knowledge-intensive activities was relatively limited until the early 21st century (Antràs, Garicano and Rossi-Hansberg, 2006). The advancements in ICT mentioned earlier have made it possible to offshore higher-skilled activities, such as software development and accounting and finance, through telecom and satellite networks (Lanz and Maurer, 2015). Furthermore, continuous ICT improvements have not only made service offshoring possible but also economically viable, particularly for offshoring higher-value-added services (Feenstra and Taylor, 2014). Consequently, the skill-intensity of offshored activities has been increasing in both the manufacturing and service sectors. This upward trend poses a higher risk to jobs, especially in industrialised countries, as a

growing number of positions become susceptible to offshoring (Feenstra and Taylor, 2014).

Another contributing factor to this trend is the continuous economic development of many relatively less developed countries along with their increasing participation in the world economy, mostly via their closest GVC network. For example, already in the early 21st century, the Asia-Pacific region attracted the largest share of FDI in R&D. Between 2002 and 2005, more than half of the world's total R&D FDI was invested in the Asia-Pacific region, creating a significant number of jobs (Huggins, Demirbag, Ratcheva, 2007). As a result, not only are more jobs at risk of being offshored, but the vulnerability of jobs previously possible for offshoring are increasing threatened.

Regarding the various forms of offshored service activities, the WTO distinguishes four modes of service supply in the context of service offshoring. The first mode is known as cross-border supply, which involves delivering services from one consumer's territory to another's (UN, 2010). Examples of this mode include consultancy services, market research activities and tele-medical advice. In the second mode, referred to as consumption abroad, services are consumed outside of the consumer's territory. This mode encompasses activities like education or tourism, including medical tourism. Modes one and two involve the crossing of borders for the delivery or consumption of services, with the service provider not being physically present in the consumer's territory. In contrast, mode three is characterised by the presence of the service provider's commercial establishment in the consumer's territory. This mode corresponds to FDI in service activities. Examples include international banks and hotel groups establishing their presence in foreign markets. Mode four of service offshoring is similar to mode three but requires the physical presence of a natural person in the consumer's territory (UN, 2010). This can involve temporary stays of employees, for instance, from MNEs or self-employed individuals providing services. Activities such as consultancy, health services, or construction can be offshored under mode four.

In summary, modes one and two involve cross-border delivery or consumption of services without the physical presence of the service provider in the consumer's territory. Modes three and four, on the other hand, entail the presence of the service provider through a commercial establishment (mode three) or a natural person (mode four) in the consumer's territory.

Mode three is considered the most significant mode of service offshoring, accounting for over half of total services trade (Lanz and Maurer, 2015). In 2010, the value-added in services provided by foreign affiliates of MNEs represented approximately 25 percent of domestic value-added in services across 18 EU countries (Lanz and Maurer, 2015). Within mode three, ICT services play a particularly important role compared to professional, scientific, and technical service activities.

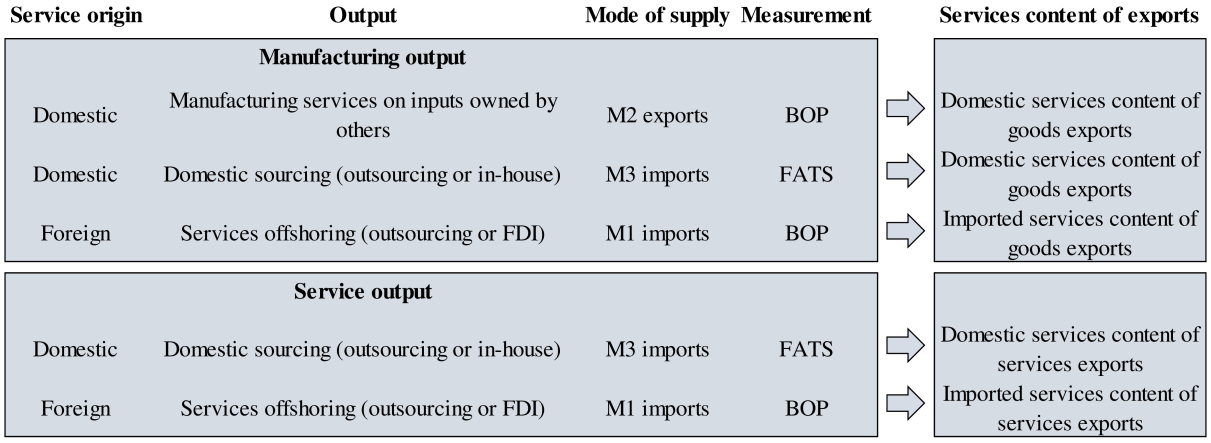
However, the measurement of mode three service offshoring is not explicitly captured as foreign services in the domestic service content of exports due to the limitations of data that do not include an ownership dimension (OECD, 2017). Additionally, internally supplied service inputs cannot be identified as contributing to GVCs through value-added analysis. While modes one, two, and four are measured using the balance of payments (BOP) method, mode three is measured using the foreign affiliates statistics (FATS) framework (Lanz and Maurer, 2015). Figure 2.12 provides a visual representation of the role of services in GVCs by illustrating domestic and foreign inputs in manufacturing and service outputs based on the mode of service supply and their role as export content. Moreover, the diagram highlights different sourcing strategies for service activities in relation to manufacturing and service output, depending on whether the inputs are sourced domestically or from abroad. It demonstrates how the servicification of manufacturing leads to distinct implications for GVCs in terms of the mode of supply and trade patterns (Lanz and Maurer, 2015). Domestic sourcing implies no international trade in intermediates, while sourcing service inputs domestically from foreign companies through a commercial presence or the presence of a natural person leads to service offshoring within modes three or four, respectively. This distinction helps explain why the share of services as export content is lower than its share of GDP, in which the movement of capital and labour is contained within modes three and four (Lanz and Maurer, 2015).

As conventional statistical frameworks, such as the BOP, face challenges in classifying products as goods or services, it becomes increasingly important to analyse service offshoring within a value-added context (Lanz and Maurer, 2015).

2.4.2 Picture of reality

Figure 2.13 consists of two diagrams comparing the gross exports of goods and services with the value-added exports of goods and services for the years 1980, 1995, and 2009.

Figure 2.12: The role of services in GVCs

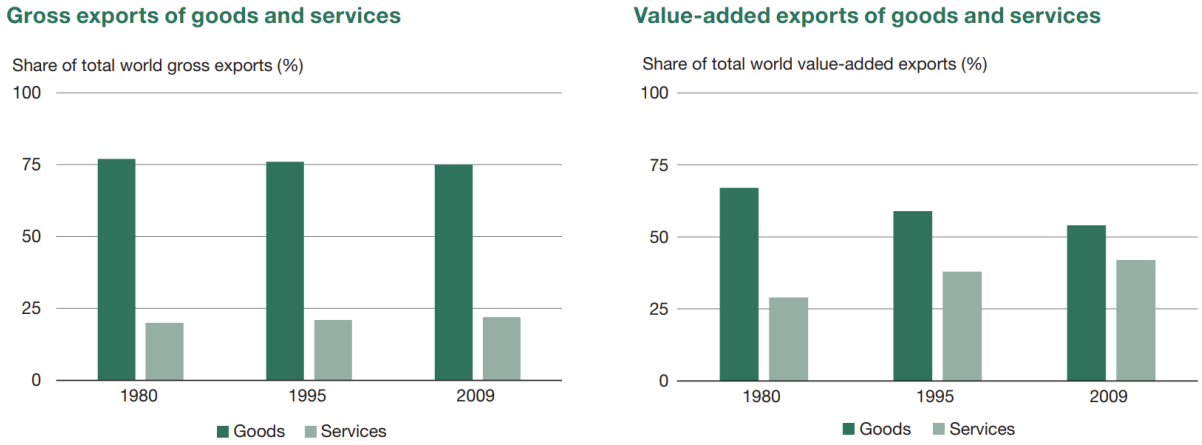


Source: Author's illustration using Lanz and Maurer (2015)

These diagrams demonstrate that the proportion of services is higher and has increased more rapidly in the context of TiVA compared to trade in gross terms over the specified period. The relative significance of goods and services shifts when exports are measured in value-added terms rather than gross terms. Between 1980 and 2009, there was a decrease in goods exports, while service exports experienced a faster increase within TiVA compared to trade in gross terms. While the share of services in gross terms remained relatively stable at around 20 percent over time, its share increased from below 30 percent to over 40 percent in value-added terms. These findings indicate that, when considering value-added data, the share of services in total exports is substantial and has been expanding over time.

The significance of service offshoring in facilitating and driving the growth of world trade is highlighted by Figure 2.14. The diagram depicts direct domestic, indirect domestic, and foreign service value-added as components of global gross exports for the RCEP member countries from 1995 to 2020. The distinction of direct and indirect domestic value-added differentiates between value-added of an exporting industry itself (direct) and value-added contained in an industry's exports from other domestic industries (indirect). While both domestic and foreign services experienced growth, it is evident that the foreign value-added component exhibited the highest increase in relative terms, rising by a factor of 5.9 over the examined period. Over the same time, direct domestic and indirect domestic service value-added increased by factors of 3.9 and 4.2, respectively. This growth is similar to the overall development as service value-added contained in exports globally rose by a factor of 5.6 over the same period while direct domestic and indirect domestic increased

Figure 2.13: Exports of goods and services in gross terms and value-added terms, 1980, 1995 and 2009



Source: Atkins et al. (2019) based on OECD (2017)

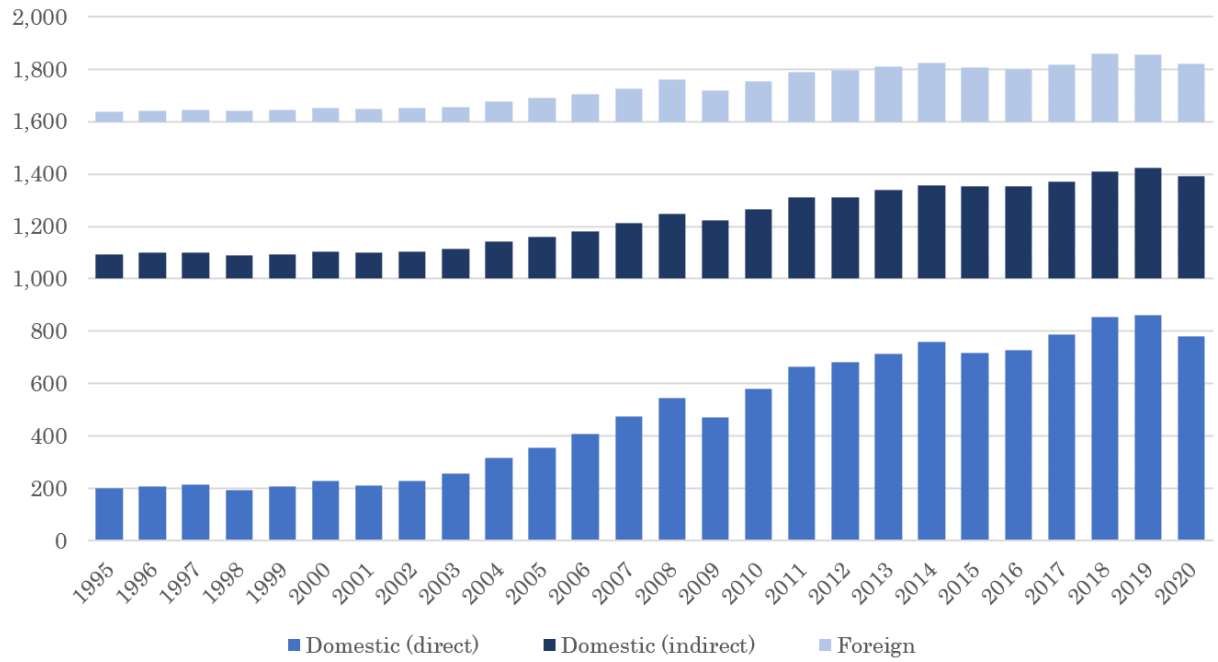
by factors of 3.5 and 3.4, respectively. This trend underscores the growing importance of service offshoring in international trade.

It is important to note that the measures presented in Figures 2.13 and 2.14 are primarily based on cross-border trade, thereby excluding the capture of service value-added trade within Mode three. Consequently, these diagrams provide a conservative estimation of the actual shift towards foreign services and, by extension, the significance of service offshoring (OECD, 2017).

Let us turn to an illustration of these metrics given by Figure 2.15 for the year 2018. The diagram illustrates the same countries as Figure 2.7, by order of total value-added content of export.

We see that the shares vary substantially across countries. Luxembourg, the UK, Singapore as well as the USA all exhibit service value-added of 50 percent or more in their gross exports, making them mainly service exporters, while countries with lower shares specialise in commodities or manufactured goods for their exports. The distribution of high shares of foreign service value-added suggests the significant presence of MNEs and the prevalence of Mode three service offshoring. Factors such as resident SPEs and tax incentives offered to specific companies or industries also contribute to this distribution. It is worth noting that, apart from Singapore, Asian countries generally exhibit lower shares of service value-added. Moreover, several countries demonstrate notably high shares of (direct) domestic service value-added, indicating their increasing participation in GVCs by leveraging their domestic

Figure 2.14: RCEP members' direct, indirect and foreign service value-added in world gross exports, 1995–2020 (in $ bn)



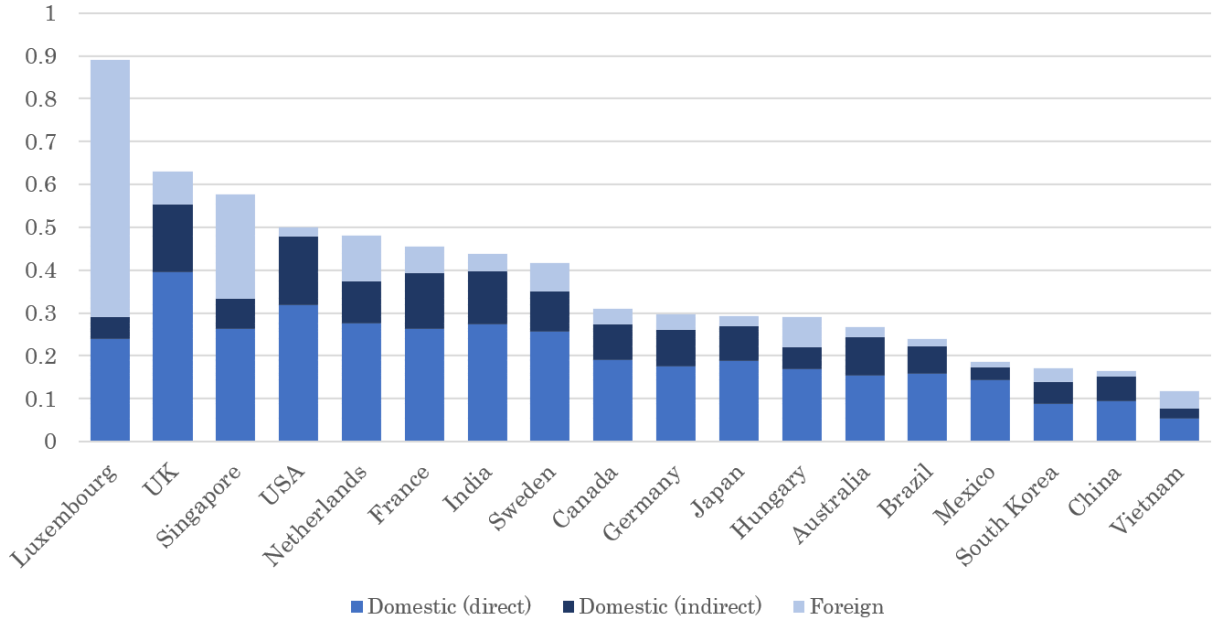
Source: Author's illustration based on OECD (2023a)

resources. Notable examples of these countries include the UK, the USA, India, Japan, Australia, Mexico and China.

Countries vary in their ability to effectively utilise inputs, making them more or less attractive for service offshoring. To make informed decisions regarding offshoring locations, companies can greatly benefit from a comprehensive understanding of the strengths and weaknesses of different economies and their respective service industries. Doh, Bunyaratavej and Hahn (2009) support this notion in their analysis of 595 service offshoring projects conducted by companies from the USA and the UK. Their study encompassed 45 economies of diverse development stages during the period of 2002 to 2005. The findings indicate that the main factors influencing service offshoring decisions are wage levels, the education of the workforce, language proficiency, and risk considerations (Doh et al., 2009).

Although this research reveals an increasing participation of relatively less developed countries in GVCs, foremost with their geographically closest GVC network, it is important to note that these countries still maintain significant restrictions on service offshoring. While regions such as Europe, central Asia and Latin America as well as OECD member countries generally exhibit relatively low restrictions, other countries and regions continue to

Figure 2.15: Direct, indirect and foreign service value-added as shares of world gross exports by country, 2018



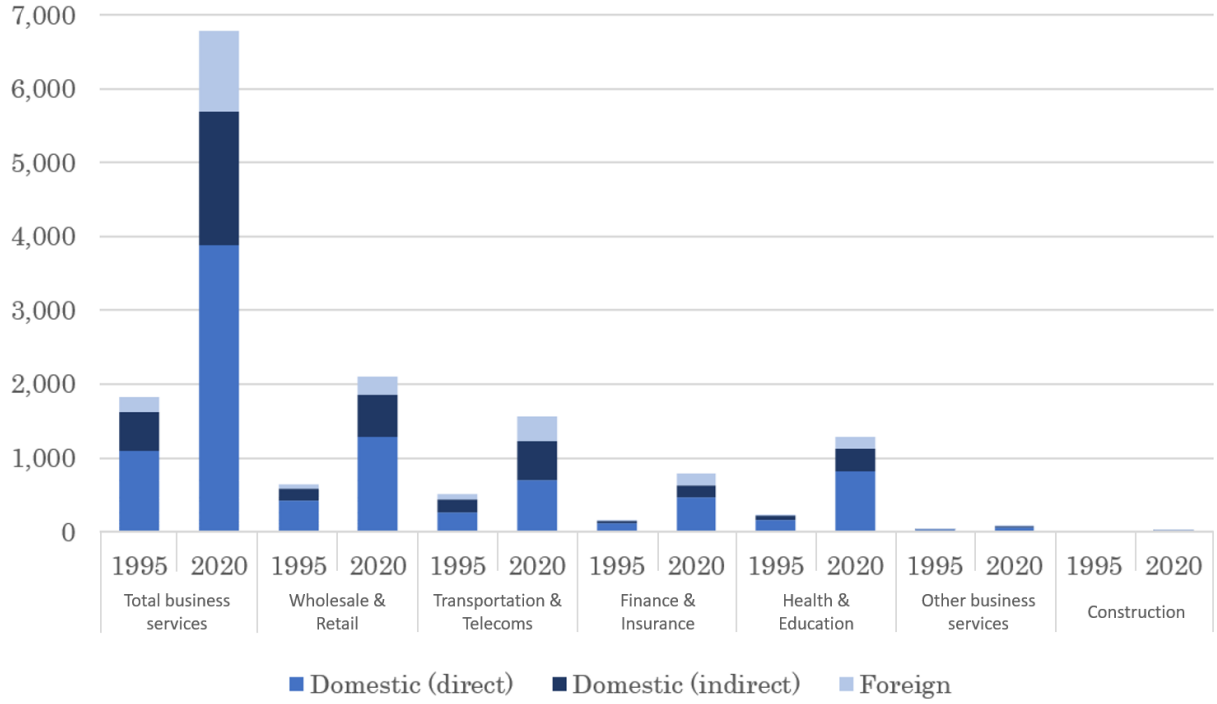
Source: OECD (2023a)

impose higher barriers against service offshoring (OECD, 2017). Notably, the protectionist measures are particularly stringent for professional services including law and medicine, followed by transportation, telecommunication, and financial services. Consequently, a considerable portion of offshoring activities tends to concentrate in relatively more developed countries.

However, it is important to consider the evolving landscape of service offshoring that has been driven by the ongoing development of economies worldwide. As countries have made strides in improving their capabilities, there has been a notable shift in the distribution of service offshoring activities. This shift has been instrumental in shaping the current scenario, where certain countries now observe more than half of their gross exports attributed to service value-added, as shown by Figure 2.15. Therefore, as economies progress and enhance their capabilities, the distribution of service offshoring activities is poised to evolve, providing new opportunities for countries to participate and benefit from this global trend.

Figure 2.16 shows the shares of direct and indirect domestic as well as foreign value-added as exports across service industries. The indirect component contains value-added from all other industries, including other service sectors as well as manufacturing industries.

Figure 2.16: Direct, indirect and foreign service value-added in world gross exports, 2020 (in $ bn)



Source: Author's illustration based on OECD (2023a)

The business services industry exhibits the highest increase in absolute terms rising from $1,821 bn to $6,787 bn of export volume, driven largely by the foreign value-added component, which increased more than fourfold. In terms of relative contribution, the service sectors pertaining to finance and insurance, as well as other business sector services, have experienced the most significant growth. The latter category encompasses professional, scientific, and technical activities, along with administrative and support services (OECD, 2023a). This growth has been predominantly driven by an increase in the foreign value-added content of exports. At the same time, both direct and indirect domestic value-added have also witnessed substantial growth, rising by factors of between 3.1 and 4.1.

Examining the share of domestic value-added across all service sectors we find a noticeable decline in relative terms for both direct and indirect domestic contributions. In each sector, the shares either decline or experience a maximum increase of one percentage point. Conversely, the foreign value-added component demonstrates an upward trend across all service sectors, with increases ranging from one to 10 percentage points. These findings clearly underscore the growing significance of service offshoring in the export activities of the service industry.

Furthermore, when considering the transportation and telecommunication service sectors, it becomes evident that they exhibit the lowest share of direct domestic value-added in their exports, accounting for 45 percent. The majority of the value-added in their exports originates from either other domestic industries or foreign sources. This emphasises the substantial reliance on foreign inputs and the importance of global connections in these particular service sectors.

In summary, the analysis of service sectors reveals the notable growth of finance and insurance, as well as other business sector services. The increasing presence of FVAiX highlights the rising importance of service offshoring. Additionally, the transportation and telecommunication sectors exhibit a lower share of direct domestic value-added, highlighting the significance of global connections in these industries.

2.4.3 Consequences

There are several notable positive effects of service offshoring that should be acknowledged. A theoretical framework proposed by Antràs, Garicano and Rossi-Hansberg (2006) provides evidence of the positive impact of service offshoring. Their model, which emphasises knowledge flows and the role of ICT, demonstrates that international offshoring leads to welfare gains in both source and recipient countries (Antràs, Garicano and Rossi-Hansberg, 2006). Companies that engage in service offshoring can focus on activities that align with their comparative advantage or high value-added tasks, resulting in increased productivity (De Backer and Yamano, 2012). This productivity boost can lead to lower prices, increased demand, and job creation, thereby offsetting potential job losses directly associated with offshoring.

Service offshoring also enables companies to overcome geographical barriers and trade costs, expanding their access to inputs and global markets. This not only benefits companies but more generally also allows relatively less developed countries to participate more extensively in the global economy and engage in international trade (Trefler et al., 2005). Moreover, improvements in ICT have facilitated the offshore sourcing of services that were previously limited to domestic providers (OECD, 2017).

Despite its positive impacts, service offshoring has several negative consequences. It can lead to a decrease in the domestic service industry over the long run, as offshore sourcing reduces domestic demand for services (Trefler et al., 2005). In the manufacturing

sector, companies may face challenges due to disruptions in supply chains caused by previous large-scale offshoring, leading to back-shoring activities to the domestic economy (The Economist, 2017). The phenomenon of Baumol's disease, characterised by a lack of productivity improvements and rising wages in personal services, further adds to the negative consequences of service offshoring (Blinder, 2006).

The impact of service offshoring on employment and wages is another critical aspect to consider. Empirical studies reveal mixed effects on employment, with service offshoring leading to small negative effects on total employment but contributing to a transformation in the composition of the workforce towards high-skilled, white-collar jobs (Crinò, 2009). Service offshoring tends to favour high-skilled employment, resulting in increased demand for highly skilled workers while reducing the demand for low-skilled occupations (Crinò, 2010). The reallocation of high-skilled activities and the potential shift in educational demand pose challenges for domestic economies that rely on knowledge-intensive industries (Craig, Gunn, 2010). Additionally, wage effects vary across skill groups, with high-skilled jobs benefited and middle- and low-skilled workers experiencing negative impacts (Kim and Hwang, 2016; Geishecker and Görg, 2013; Acemoglu et al., 2015).

In assessing the overall effects of service offshoring, it is important to understand the policy implications and the influence of offshoring on employment and wages within economies (Palley, 2008). Evaluating the magnitude of positive and negative effects is challenging, but policy-makers should carefully consider the labour market implications and aim to protect workers affected by offshoring (Kim and Hwang, 2016).

In conclusion, service offshoring presents both positive and negative consequences. While it can lead to productivity gains, expanded market access, and economic growth, it can also have adverse effects on employment, the domestic service industry, and wage inequality. Understanding these implications is crucial for developing effective policies that maximise the benefits and mitigate the challenges associated with service offshoring.

2.4.4 Policy implications

Service offshoring carries important policy implications for both service and manufacturing sectors, as well as for GVCs. Services should be treated separately from goods in policy considerations, given the differences in trade, regulation, and value creation (OECD, 2017). The nature of service offshoring, which involves the movement of service consumers or

suppliers rather than the services themselves, highlights the importance of behind-the-border measures over border regulations like tariffs. Therefore, specific policy implications arise from the unique characteristics of service offshoring, which can positively impact economies' productivity, comparative advantage, participation in the world economy, and the skill-intensity of activities performed.

Public concerns about offshoring, particularly in highly developed countries, often revolve around its potential negative effects on domestic labour markets, including job losses and reduced tax income. However, it is important to note that certain offshored services, such as call centre, back-office and accounting tasks, are complementary rather than substitutive and do not directly result in job losses (Kim and Hwang, 2016). Moreover, offshoring activities can contribute to the creation of jobs by foreign affiliates of MNEs in the domestic economy (Slaughter, 2010; United States Department of Commerce, 2017). Restricting offshoring could lead to missed opportunities for economic growth and job creation, particularly if complementary activities are not performed at all or if companies lose their competitiveness and productivity (Blinder, 2006; Feenstra and Taylor, 2014; Slaughter, 2010). Therefore, policies should strike a balance that supports the positive aspects of offshoring while providing appropriate support and protection for affected workers.

The consequences of service offshoring on wages and employment are complex and vary across skill groups. High-skilled jobs tend to benefit from offshoring, while middle- and low-skilled workers may face negative wage effects (Kim and Hwang, 2016; Geishecker and Görg, 2013). Offshoring can also lead to shifts in the composition of the workforce, with a higher demand for high-skilled occupations and a decreased demand for low-skilled ones (Crinò, 2010). These dynamics highlight the need for active labour market policies that offer appropriate training, retraining, and income support for affected workers. Education and skill development programs should align with the changing demands of the domestic economy to ensure a skilled workforce that can adapt to new job requirements. Protecting workers in both high- and low-skilled occupations and addressing wage inequality should be key considerations in labour market policies.

While service offshoring can have positive effects on economies, it is essential to recognise that short-term job losses may occur. However, these losses are often offset by gains in overall welfare and productivity (Feenstra and Taylor, 2014). It is crucial to understand that the benefits of service offshoring extend beyond job creation and encompass productivity

improvements, increased global participation, and the facilitation of higher value-added activities (OECD, 2017). Relatively less developed countries, in particular, stand to gain from policies that foster foreign investment and trade openness, enabling them to participate more fully in GVCs (OECD, 2017). However, it is necessary to address obstacles such as weak institutions, corruption, and inadequate infrastructure that hinder the growth of small and medium-sized companies in developing economies. Harmonisation of regulations and institutional improvements can enhance the potential for exploiting economies of scale and enable more effective participation in GVCs.

In conclusion, service offshoring presents a complex set of policy implications that require careful consideration. Policy measures should aim to maximise the positive impacts on productivity, comparative advantage, and participation in the world economy while minimising the potential negative consequences on employment, wages, and income inequality. Balancing the benefits and challenges of service offshoring requires comprehensive labour market policies, support for affected workers, investments in education and skill development, and efforts to improve institutions. By implementing well-designed policies, economies can harness the potential of service offshoring while ensuring a fair and inclusive distribution of its benefits.

2.5 Conclusion

The developments of specialisation, trade and offshoring analysed in this chapter illustrate that the present world economy hardly reflects the traditional picture of offshoring by which developed countries' technology is combined with developing countries' labour. The analysis emphasised the importance of constant improvements in transportation and ICT that has caused a continuously changing pattern of offshoring. In fact, the majority of offshoring occurs between industrialised economies, mostly because of the relevance of the quality of institutions, distance, trade costs as well as unit labour costs. Even though material offshoring is larger in magnitude and exhibits a more pronounced production fragmentation, service offshoring increases much faster, which is illustrated especially by TiVA data. They also illustrate the increasing fragmentation and geographical separation of international production and highlight the three intraregional clusters North America, Europe and East Asia. The world economy, although interconnected by feasibility and sometimes economic viability of transportation, remains regionally segregated for the

largest share of offshoring. Even though intermediate inputs continue to rise in absolute and relative terms, due to the opportunity cost of time and the importance of unit labour cost, the trend of regional trading hubs is therefore set to persist in the future.

The sourcing strategy model assumes differences between North and South that correspond to those between developed and developing countries of the traditional view of offshoring. Nevertheless, these assumptions are in accordance with the picture of reality of offshoring, since factors such as lower labour costs and other variable costs are reflected by the differences between the locations of suppliers and recipients of offshored activities in the world economy. According to the model's analysis, companies engage in vertical integration only in headquarter-intensive sectors, whereas the decision whether intermediate inputs are obtained domestically or from abroad is determined by companies' productivity. The sourcing strategy model's industry-level analysis finds that FDI becomes more prevalent compared to offshore-outsourcing if corruption in the offshore location reduces or its legal system improves. This stresses the importance for potential recipient countries of offshored activities to improve the quality of their institutions in order to induce inward investments by foreign MNEs. This specifically applies to relatively less developed countries with view to upgrading their economies as well as service offshoring, since this allows economies to move up the value-added chain through an increasing skill-intensity of activities and related productivity increases. Countries can also benefit from investing in their education systems, which positively affects labour productivity and therefore reduces unit labour costs. This in turn encourages investment and allows an increasing participation in GVCs and the world economy.

From the perspective of suppliers of service offshoring, policies are required that compensate employees for income losses resulting from offshoring. Despite structural unemployment and lower post-displacement wages, especially concerning service activities, offshoring causes overall gains in welfare as negative short-term effects are offset by long-term gains. Since service offshoring causes a higher demand for activities requiring highly skilled employees, whose wages rise as a result, it induces investments in education and calls for policies that prepare the labour market for a changing composition of the workforce. Further research is required to assess the precise effects of service offshoring on labour markets.

The analysis in this dissertation has clearly illustrated the rising importance of service offshoring in manufacturing and service industries. While material offshoring is larger

in volume, service offshoring rises much faster. High and increasing shares of service value-added are most pronounced for business services, in particular finance and insurance activities, while the rising international fragmentation of production in manufacturing industries requires additional service activities, in both the recipient and the host location of offshored activities (as was also highlighted by the sourcing strategy model). In addition, this servicification of manufacturing is partly due to an increasing convergence between physical goods and services as manufacturing companies sell services in combination with their manufactured products in order to provide added value for their customers. Contributing factors are the increasing tradability of services and the growing demand for impersonal services, for which production and consumption do not necessarily occur at the same time.

3 The Regional Comprehensive Economic Partnership (RCEP) agreement and its impact on the German economy

3.1 Introduction

The RCEP agreement is the FTA that creates the largest free trade zone worldwide. In November 2020, it was signed by 15 East Asian and Pacific countries including the economic giants China, Japan and South Korea, a number of emerging markets and some smaller economies while India opted out at a late stage (Flach et al., 2021). On January 1st, 2022, it entered into force for 10 of the 15 countries and for most others it did soon afterwards.

RCEP accounts for approximately 30 percent of the world's aggregate economic output, 28 percent of world trade and its countries inhabit approximately 2.3 billion people (UN Comtrade, 2023). Because of its influence, RCEP is going to change the world economy as value chains within the RCEP cluster and with its trading partners are being rearranged through enhanced regional integration in East Asia.

This holds for Germany as RCEP is one of its most important trading regions with 19 percent (218 billion U.S. dollars ($ bn)) of Germany's imports coming from and 14 percent ($188 bn) of its exports going to the region in 2020 (UN Comtrade, 2023). Research about the expected impact of RCEP on the German economy and especially its sectors, however, is scarce and insufficient, despite being fundamentally important because of the potentially immense economic effects.

It is unclear how Germany should best react economically and politically in order to benefit most from the agreement and its consequences instead of losing trade volume and global market share. Existing contributions in literature fail to assess key questions in this regard, in which this chapter makes a step forward. For example, should Germany diversify its imports of intermediates in the manufacturing industry of computer, electronic and optical products from RCEP in order not to become overly dependent on a single region and, for instance, be vulnerable to supply shortages such as experienced in the wake of the COVID-19 pandemic and its consequences? Should Germany rely more on imports from RCEP regarding intermediate inputs in the automotive industry from RCEP because the cost advantage of these imports is expected to increase as supply chains become more resilient in the region? Moreover, should Germany invest locally in the RCEP region in order to gain from local benefits and counteract trade diversion effects and, if yes, in which sectors should Germany invest?

RCEP's harmonisation of the rules of origin is considered the greatest achievement of the

agreement. It enables far-reaching tariff-free trade of products between member states as value added to products in any member state is counted as domestic production. This promotes GVCs as it becomes less costly for goods to cross borders, also multiple times. The impact on GVCs is particularly relevant for complex GVCs in which inputs cross borders several times. In fact, complex value chains are relatively more prevalent in RCEP than simple GVCs, which emphasises the opportunities stemming from the agreement (Flach et al., 2021). In China, for instance, while 4.8 percent of total produced value is created by simple GVCs, 6.7 percent is created in complex value chains. Hence, value created in complex GVCs as a share of GVC production is 58 percent for China, compared to 52 percent for RCEP on average, 41 percent for the EU and 42 percent for the USA (Flach et al., 2021).

Economies like Germany benefit from RCEP's liberal rules of origin allowing for preferential treatment of goods containing a substantial amount of foreign value-added. Reduction of tariffs have relatively less impact on Germany and overall, since the ten nations forming the Association of Southeast Asian Nations (ASEAN[4]) already have bilateral trade agreements in place, reducing tariffs in the region (Matthes and Kolev, 2020). It is estimated that 83 percent of traded goods ($2.3 tn in 2019) in the region are related to trade pacts existing prior to RCEP (The Economist, 2020).

Park et al. (2021) estimate that the reduction of non-tariff barriers ( ) on goods and services make up two thirds of the effects of RCEP while tariff liberalisations as well as rules of origin each account for approximately 16 percent and investments contribute some two percent (Park et al., 2021). By 2030, they project an incremental increase of $465 bn in exports from RCEP members to other RCEP members as well as $49 bn to other countries due to RCEP (Park et al., 2021). In line with FTA theory, they also project a significant decrease in trade outside RCEP. Their analysis is based on a computable general equilibrium (CGE) model, the workhorse tool in analysing the impact of policy interactions and is conducted on country and sector level. Overall, they find positive effects on trade volume, which is in line with other results as is discussed in more detail in Section 3.3.

Hence, for Germany we expect the largest trade diversion effects resulting from reduced NTB and the effects of harmonised rules of origin. To answer the questions posed above

[4]Brunei, Cambodia, Indonesia, Lao, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam (see also Figure 3.2)

and give recommendations for action, a detailed analysis of the potential consequences of RCEP on the German economy is necessary on country- and industry-level, which is this dissertation's contribution.

The remainder of this chapter is organised as follows. We analyse the RCEP agreement in detail, looking at the provisions in its different chapters, illustrating its strengths and weaknesses as well as its potential, and comparing it to the CPTPP[5]. The analysis of the impact of the RCEP agreement on the Germany economy follows. Besides analysing imports and exports on country- and sector-level we answer questions such as how Germany is tied into RCEP GVCs, how large the shares of domestic and foreign value-added are and how this has changed over time. This enables a profound understanding of today's and past trade patterns and provides the basis for interpreting the results in the subsequent discussion.

3.2 The RCEP agreement in detail

RCEP was agreed between the ASEAN countries Brunei, Cambodia, Indonesia, Lao, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam, the ASEAN+3 countries China, Japan, South Korea as well as the ASEAN+6 countries Australia and New Zealand except for India (see Figure 3.2). Some members states, like China, South Korea and Japan, are among the most developed and wealthiest economies globally while others, like Lao or Cambodia belong to the relative least developed and poorest economies. Despite causing challenges for RCEP regarding its depth as well as its implementation, as discussed in the following, this diversity among member states enables a more efficient fragmentation of tasks and thus more efficient supply and value chains (Park et al., 2021). The geographical proximity of the countries supports this, as can be seen in Figure 3.1.

It was signed in November 2020 after 30 rounds of negotiations during eight years. Thereafter, it took longer than expected to be ratified mainly due to the COVID-19 pandemic shifting domestic priorities, while Australia's political tensions with China slowed their domestic ratification discussions (The Economist Intelligence Unit, 2021). The minimum requirement for RCEP to enter into force 60 days later for the respective countries was a minimum of six ASEAN as well as three non-ASEAN states domestically ratifying the agreement. This was met in late 2021 (RCEP, 2022a). The agreement entered

[5]For an overview of member states see Figure 3.2

Figure 3.1: The RCEP zone as a region of its 15 members

Source: Author's illustration

into force for the first 10 of the 15 countries on January 1st, 2022, namely Australia, Brunei, Cambodia, China, Japan, Lao, New Zealand, Singapore, Thailand as well as Vietnam. For South Korea (February 1st) and Malaysia (March 18th) entry into force came in the subsequent two months, for Indonesia on January 2nd, 2023, and for the Philippines on June 2nd, 2023 (Australian Department of Foreign Affairs and Trade, 2022). Myanmar remains the single country for which RCEP has not entered into force entirely, despite having ratified the agreement already in 2021, which is due to political tensions and non-acceptance of some of the agreement's members, while others like China and Thailand have started applying the provisions also to Myanmar[6]. Myanmar's share of RCEP trade and GDP is less than one percent and China is its largest trading partner (OECD, 2023a). Consequently, the RCEP agreement can be seen as implemented.

RCEP is the world's largest FTA before the EU, the USMCA (formerly North American Free Trade Agreement (NAFTA)) as well as the CPTPP. Its member countries generate around 30 percent of global economic output, approximately $26 tn (Plummer and Petri, 2021). This can rise to more than half of the world's GDP by 2030 (Neumann and

[6]The ratification of the agreement is seen with concern and doubt by some of RCEP's members in the wake of the 2021 military coup in Myanmar and RCEP's ASEAN members in July 2022 agreed that the decision whether to accept Myanmar's ratification is to be made by each country itself who then inform the ASEAN secretariat and the other RCEP members (Japan External Trade Organization, 2022). Thailand, Singapore and China have started applying the RCEP provisions also to Myanmar (Singapore Ministry of Trade and Industry, 2023; General Administration of Customs of the People's Republic of China, 2022).

Rajanayagam, 2020). RCEP amplifies the global trend of the economic centre of gravity moving toward Asia, which comes at a time when the global COVID-19 pandemic reinforces regionalisation as opposed to globalisation due to new constraints in global supply chains, especially in manufacturing industries (Frenkel and Ngo, 2021).

RCEP comprises 20 chapters, among others dealing with trade in goods, rules of origin, customs procedures, trade in services, investments, intellectual property rights, as well as e-commerce. The agreement's main goal is forming an economic partnership that eliminates tariffs, thereby raising regional flows of trade and investment (RCEP, 2022a). Tables B1 and B2 (see Appendix B) summarise the main features of the agreement. For Germany, Chapter 2 (trade in goods), Chapter 3 (rules of origin), Chapter 8 (trade in services) as well as Chapter 10 (investment) are most relevant due to their impact on RCEP's foreign trade.

India left the negotiations a year before the agreement was signed. Beside some domestic political issues, the decision was made mainly because of economic factors including trade deficits with 11 of the 15 RCEP members as well as the fear of Chinese competition in sectors such as manufacturing (Petri and Plummer, 2020). As RCEP decreases trade barriers, imports from other countries are likely to increase, posing a risk to some domestic production. Besides manufacturing India was worried about the domestic agricultural sector in view of rising imports from Southeast Asia as well as Australia and New Zealand (Hilpert, 2021). Experts expect India to face negative economic effects due to its withdrawal from RCEP with lost trade and income as opposed to positive estimated effects in case of its accession (Petri and Plummer, 2020; Hilpert, 2021).

The current member states have previously reinforced the option for India to join the agreement (South Korean Ministry of Trade, Industry and Energy, 2022). This would be welcomed by several RCEP members, as India is seen as a balancing counterpart to China both economically and politically (Petri and Plummer, 2020). Currently, however, this does not seem likely going by a public statement of India's minister of commerce and industry Piyush Goyal in early 2023 (The Economic Times, 2023). As multinational companies that intend to decrease their dependence on China aim for a diversifying strategy, this could yield large opportunities for India in Asian supply chains, especially for labour-intensive manufacturing activities (Financial Times, 2023). Benefiting from such opportunities through more involvement in Asian supply chains and taking market share is something the RCEP membership could assist in, especially concerning the harmonised rules of origin.

Accession to RCEP is generally possible for any state, since 18 months after entry into force have passed, subject to the consent of the agreement's members (RCEP, 2022b). Both Hong Kong and Sri Lanka have already taken the opportunity to formally apply for accession to RCEP (The Government of the Hong Kong Special Administrative Region, 2023; Ministry of Foreign Affairs Sri Lanka, 2023). Also Bangladesh is likely to apply in the future, which is highly recommended by experts, for instance, regarding its large apparel industry (The Business Post, 2023; UN, 2023).

RCEP, CPTPP and motivations to form FTAs

This subsection outlines the motivation for countries to form FTAs, analyses how trade regulations have evolved from GATT and WTO and shows the gap that RCEP and CPTPP close.

Let us first look at what FTAs are and why they are formed. Countries form FTAs based on the principles of free trade, which is opposed to protectionism and economic isolation. FTAs constitute a written consent of the involved parties to enable international trade of goods and / or services with little or no tariffs, customs and other trade-barriers as well as in some cases, like RCEP (see Tables B1 and B2 in Appendix B), they prescribe the modus operandi regarding investments, subsidies or intellectual property rights (Grossman and Helpman, 1993).

Petri and Plummer (2020) refer to trade agreements as being sticky, influencing trade patterns and thereby shaping institutions as well as policies. FTAs have overall positive trade effects for participating parties, based on the principles of free trade and comparative advantage (Ricardo, 1817). Moreover, they have an influence on third countries that can be positive or negative or both at the same time. On the one hand, FTAs have a negative impact on outside economies for they exclude them from the agreed benefits making their output relatively less competitive. One the other hand, the economic growth that usually comes with FTAs for its partner countries generally also benefits third countries (Matthes and Kolev, 2020). Therefore, whether an FTA's benefits outweigh its negative effects for an economic agent is determined by the effects' magnitude and these are different for different products or services, companies, sectors and countries as domestic and international trade shift to some extent.

Reductions of tariffs and NTB, lower production costs and thus more robust value chains

enable positive consequences in terms of trade volume. Harmonised rules of origin, as in the case of RCEP, set unified trade standards and amplify positive trade effects. Participating nations benefit from an enhanced market access and there is an incentive for local companies to use suppliers from within the region of the respective FTA. The magnitude of this effect is different for different products, depending on the respective elasticity of substitution. In the case of RCEP, several countries that are relatively less developed gain enhanced access to one of the world's largest markets. Moreover, as pointed out by Li et al. (2017) as well as Amidi and Majidi (2020), RCEP members benefit from the regional trade liberalisation in the form of increased efficiency and productivity, boosting economic growth. Local companies gain relative competitiveness.

In Section 3.5 we differentiate the impact of FTAs such as the trade creation effect and the trade diversion effect and illustrate them by means of analysing RCEP's effect on Germany (Baldwin and Wyplosz, 2019).

Motivations for entering into an FTA are led by economic and political aspects and are closely aligned with incentives of international trade in general, like market expansion, attraction of investment, more efficient division of labour, scale effects, etc. Besides these general motivations for countries to form FTAs the slow pace at which the WTO makes improvements, as for instance in the case of environmental regulations and standards, incentivises the formation of bilateral and regional FTAs, making it easier to align on common goals (Urata, 2002).

In Chapter 2, we outlined the development of trade and motivations that led to the founding of the GATT in 1947, since 1995 known as the WTO (WTO, 2023a). The goal of FTAs is closely related to the principle of comparative advantage by David Ricardo, which is the primary determinant of the world's trade pattern.

While the Industrial Revolution's developments made the geographical separation of manufacturing stages possible, the ICT revolution made it economical. The GATT made this even more economical due to decreased costs of trade and together with FTAs in general can therefore be seen as a multiplying factor in this regard, due to overall positive trade effects, as shown in Section 3.5. This also applies to offshoring as a type of international trade, as outlined in previous chapters.

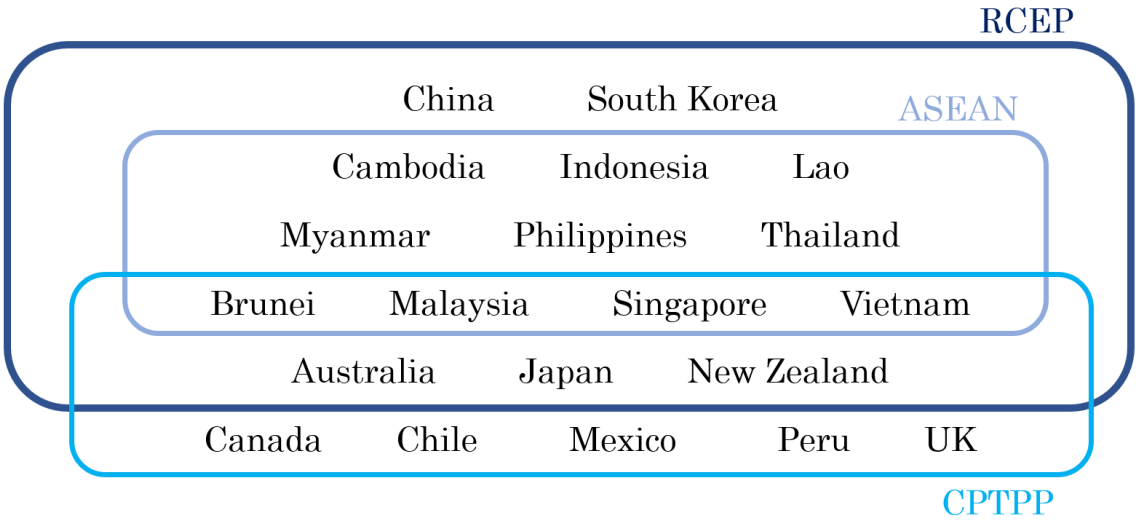
The WTO is relevant still today, remaining a forum that brings together more than 150 nations, setting trade standards and providing a mechanism for fair dispute settlements.

Moreover, its main activities include the surveillance of rules and regulations, the surveillance of trade politics of its members, also regarding transparency on bilateral and regional agreements, as well as conducting economic research (WTO, 2023b). The relevance of these aspects became clear, for instance, during the financial crisis of the late 2000s when there was an existing infrastructure for the reporting of trade politics with the aim of creating transparency. This is something that is unlikely to ever be provided by regional trade agreements or coalitions and would not be as effective due to a smaller number of participating countries compared with the WTO.

However, the WTO faces challenges in updating the existing agreements and including new topics, such as e-commerce as well as labour and environmental standards. It has not been updated thoroughly since 1995, leading to unfair regulations on competition regarding subsidies and compensatory measures (Germany Trade and Invest, 2023a). Moreover, the dispute settlement committee is restrained as it currently consists of only two judges instead of its prescribed minimum size of three judges. Several attempts by many WTO members to fill the vacant positions on the committee have failed as the USA remains concerned about a transgression of the judges' competences as well as long durations of proceedings (Germany Trade and Invest, 2023b). The USA are interested in collaborating on this issue, however, demand a reform of the WTO's dispute settlement mechanism.

As pointed out, this incentivised the formation of many bilateral FTAs, as discussed further in the context of the geographical RCEP region in the following subsection, as well as regional agreements like the CPTPP and RCEP itself. The latter, together with others such as the EU and USMCA, can be seen as the middle layer between the WTO and bilateral FTAs, closing the gap and providing far-reaching regulations and free trade together with some form of harmonisation. Other FTAs in this context include, for instance, several agreements the EU made with other parties such as the Comprehensive Economic and Trade Agreement, the EU-Japan Economic Partnership Agreement, the EU-South Korea Free Trade Agreement as well as the EU-Mexico Global Agreement, all of which eliminate trade barriers for goods and services and include provisions on investment (European Commission, 2023a). Moreover, the Comprehensive Agreement on Investment (CAI) was agreed in principle in late 2020 between the EU and China with its focus and extensive provisions on investment and market access, which however has not yet entered into force (European Commission, 2023b). A more detailed analysis of these and other FTAs are beyond the scope of this dissertation.

Figure 3.2: Trade groups in the Asia-Pacific region



Source: Author's illustration

Given its large number of members and their diverse economies, RCEP is not an agreement as extensive as the CPTPP, which exhibits a higher density of relatively more developed economies, as can be seen in Figure 3.2. This supports the CPTPP in eliminating 96 percent of tariffs on products traded among member countries. It was developed from the Trans-Pacific Partnership (TPP) after the USA pulled out of the agreement in 2017 (Frenkel and Ngo, 2021). It was signed in 2018 by 11 countries around the Pacific, with this accounting for 13.3 percent of world GDP, 6.7 percent of the world's population and 14.4 percent of world trade (Australian Department of Foreign Affairs and Trade, 2021). Figure 3.2 exhibits the large overlap of member states between CPTPP and RCEP. On the one hand, as the relatively less developed countries are not part of the CPTPP, it was possible to set higher standards regarding, for instance, labour law and sustainable development. On the other hand, the absence of China and the USA enabled a more far-reaching trade liberalisation (Frenkel and Ngo, 2021).

The UK became the first additional CPTPP member when joining the FTA in July 2023 through the accession process after it had handed in a formal accession request in February 2021 (UK Parliament, 2023). This makes the CPTPP members account for 14.5 percent of global GDP (Peterson Institute for International Economics, 2023). After President Biden of the USA had indicated his motivation in re-negotiating with CPTPP member states in January 2021 (Frenkel and Ngo, 2021), the USA has moved away from this position, aiming at forming an economic framework with the Asia-Pacific region that goes beyond the CPTPP (Nikkei Asia, 2021). There has not been specific progress in this regard

since, however. Should both the UK and the USA eventually join the CPTPP, or form separate far-reaching agreements, this could prove a substantial counterbalance in the world economy to RCEP with its member states China, South Korea and Japan. China itself, however, has already applied to join the CPTPP alongside Taiwan, Costa Rica, Ecuador, Uruguay as well as Ukraine while South Korea and Thailand have expressed their interest (Peterson Institute for International Economics, 2023).

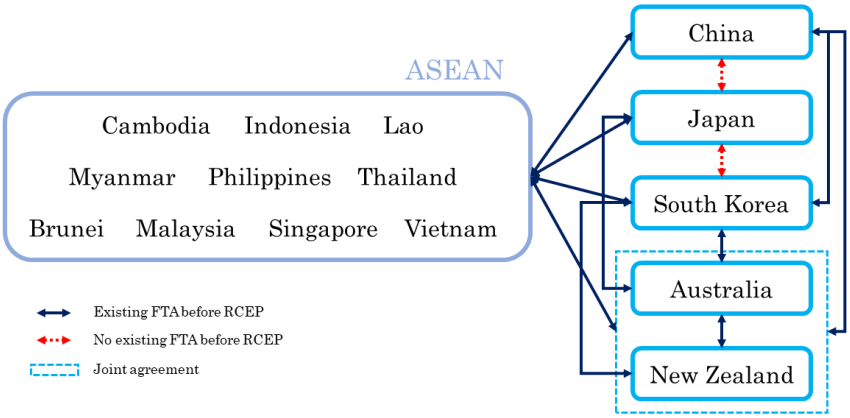
Most chapters that are included in both agreements merely exhibit minor differences, such as that investor-state-dispute settlements are not yet incorporated into RCEP. Moreover, CPTPP uses negative list approaches more rigorously (Chaisse and Pomfret, 2019). Albeit all chapters of RCEP are found in CPTPP, RCEP does not include chapters on social standards, environmental protection, labour or state-owned companies and monopolies while the provisions on trade in services are not very far-reaching. The latter are mainly aimed at ensuring the current liberalisations are kept in place as well as enabling companies from outside the region an enhanced market access and are mostly limited to services in finance, telecommunications as well as professional services (Frenkel and Ngo, 2021).

Let us look at the depth of the RCEP agreement and its unique provisions, before the subsequent subsection displays effects on world trade and income, also comparing it to the CPTPP.

The large differences among RCEP member states regarding their level of development made it necessary to agree on the lowest common ground in some regards. Nevertheless, it is an extensive and far-reaching agreement as illustrated in the following. Besides the CPTPP and the ASEAN organisation itself, with its trade barrier reductions, ASEAN's 10 member states had bilateral FTAs in place with the five non-ASEAN states that form part of RCEP, namely China, Japan, South Korea, Australia and New Zealand, as can be seen from Figure 3.3. In addition, Australia and New Zealand already had bilateral trade agreements in place. The three largest RCEP members, however, China, Japan and South Korea, had not made such agreements as China and Japan as well as Japan and South Korea had been lacking bilateral FTAs entirely. Hence, these are the countries with the highest tariffs still in place, which is in large parts due to cultural reasons, and for which the largest tariff reduction is expected (Flach et al., 2021).

RCEP will eliminate approximately 90 percent of tariffs on goods for intra-RCEP trade over 20 years (Park et al., 2021). Since its entry into force, approximately 65 percent

Figure 3.3: FTAs existing before RCEP among its members



Source: Author's illustration based on Frenkel and Ngo (2021)

of goods can be traded tariff-free in the region (Frenkel and Ngo, 2021). The average tariff for trade between RCEP members was 1.6 percent in 2017. Moreover, RCEP is designed to be enhanced and extended over time, a method used by ASEAN before, by mechanisms stipulated in the agreement that allow for changes (Petri and Plummer, 2020). These include, for instance, a most-favoured nation (MFN) clause for service trade, which determines that any RCEP member state grants another member state the same concessions it grants any third country (RCEP, 2022b). MFN treatment of other member states also applies for customs duties of goods trade (Chapter 2) as well as investments (Chapter 10). Another remarkable aspect regarding the provisions on services is that member states ought to use a negative list approach whereby every service not listed is considered liberalised (RCEP, 2022a).

The harmonisation of the rules of origin is considered the greatest achievement (Flach et al., 2021). Every trade agreement comprises a set of rules referred to as the rules of origin. Exporters ought to prove a certain share of domestic production to avoid paying tariffs and receiving preferential entry into a market. In order to avoid a 20 percent tariff for the entry into Lao, for example, Chinese vehicle producers prior to RCEP had to provide proof that at least 40 percent of the product comes from China itself or another ASEAN country (Flach et al., 2021). The main issue is that the rules of origin differ for every bilateral FTA as well as for every country and sector, making the rules to comply with for preferential treatment very complex. Fragmented value chains, in which intermediate inputs cross multiple borders, make it more difficult. By essentially counting all intermediate inputs

from the 15 member states as domestic production, RCEP consolidates and harmonises the rules of origin. This promotes GVC trade as it becomes less costly for goods to cross borders, also multiple times. In effect, the Chinese vehicle producer is going to need merely one certificate of origin for its exported goods. Especially small- and medium-sized enterprises (SMEs) are expected to benefit from the reduced regulatory burden by harmonised rules of origin, enabling them to reach a larger number of customers more easily. This applies to German SMEs present in the RCEP region.

Until the harmonised rules of origin can deliver on their full potential, however, it will take up to 20 years until all planned tariffs on goods are eliminated. For this process, each RCEP member has its own schedule of tariff commitments. The RCEP agreement considers the special requirements of their economically less developed members. This applies specifically to each member's schedule of tariff commitments (Annex I of the agreement, see RCEP, 2022b), Economic and Technical Cooperation (Chapter 15) as well as the provisions on dispute settlement (Chapter 19). On the one hand, this represents a significant assistance of less developed country members in engaging more in the GVCs of the region, which allows for the region's deeper integration. On the other hand, these flexibilities make RCEP less rigorous, for instance, compared with CPTPP.

3.3 Effects of RCEP and CPTPP

In the subsequent section the analysis is focussed on the effects of RCEP on the German economy by means of, among others, an analysis of trade flows on country- and sector-level, interpretation and discussion of results as well as recommendations for action. Before, this section looks at the more general effects of RCEP and the CPTPP for two reasons. Firstly, it adds context and provides a future outlook on the basis of the analysis of the previous sections in respect of the RCEP agreement, in comparison to others as well as regarding its depth. Secondly, it sheds light on the argumentation made that RCEP changes the world economy, impacts many countries, sectors and companies as well as trading relationships and adds to the argumentation that the economic centre of gravity is moving toward Asia. Therefore, this subsection incorporates other metrics like income and the skill-intensity of labour.

As mentioned, Park et al. (2021) estimate that the reduction of NTB on goods and services make up two thirds of the effects of RCEP while tariff liberalisations as well as

rules of origin each account for approximately 16 percent and investments contribute some two percent. In order to obtain a quantitative projection of the future impact of RCEP in terms of trade volume, they use a CGE model analysis. CGE model analysis offers ex-ante quantitative insights into complex future effects of policy interactions like FTAs on medium- to long-term projection. It has become the workhorse tool in analysing the impact of policy interactions in recent years and is used as the key modelling tool in this context by researchers and governments. This is because the method caters best to the two main functions of modelling in the analysis of changes in trading relationships. Firstly, information is needed in the process of designing trade policy when choices are made under uncertainty of outcomes (UK Department for International Trade, 2022). Secondly, decision-makers other than those designing trade policy as well as the public need to be informed. CGE models can be mapped for various countries and regions of the world, on country- or industry-level, and account for interactions between economies but also companies and households. Results can be obtained, for instance, in terms of trade or income, yielding implications for economic agents and showing structural change (Park et al., 2021). Assumptions can include the profit-maximising nature of firms together with utility-maximising consumers, supply being equal to demand as well as assumptions about production technologies, factor supplies, trade patterns and consumer preferences or elasticities. The latter indicate the magnitude of changes regarding the selected variables of interest like trade. To give a specific example in the context of RCEP: how many more vehicles will be exported from Japan to China because Chinese consumers substitute them for German vehicles, due to decreased prices of the former? The magnitude of this change is determined by the (price) elasticity of substitution of Chinese consumers. Whether goods are substitutes or complimentary affects the impact of RCEP provisions and these differences are captured in a CGE model.

Trade effects

Firstly, let us look at the effect of RCEP on trade in terms of exports. Table 3.1 shows the incremental changes in goods and services traded in 2030 as a result of RCEP's provisions, estimated by Park et al. (2021) by means of a CGE analysis. We later compare results of other analyses. By 2030, an incremental increase of $465 bn in exports is estimated from RCEP members to other RCEP members as well as $49 bn to other countries. In line with FTA theory, a significant decrease in trade outside RCEP is projected. This

constitutes an increase in intra-RCEP trade of 11.4 percent.

Moreover, Table 3.1 shows that exports from non-members of RCEP will increase slightly by $31.8 bn (0.5 percent) and inversely, exports from RCEP countries to others will increase by $48.6 bn (0.8 percent) and acquire additional market share. Exports among non-members will contract by $49.4 bn (0.3 percent), while overall exports worldwide will rise due to RCEP's effects by $496.2 bn (1.4 percent).

Table 3.1: Incremental export changes by 2030 resulting from RCEP (in $ bn)[7]

Importer-Exporter	CHN	JPN	KOR	BRN	IDN	MYS	PHL	SGP	THA	VNM	CLM	AUS	NZL	RCEP	Not RCEP	Total
China (CHN)	0.0	89.5	9.0	0.2	4.9	21.1	6.9	0.2	12.8	16.3	2.3	5.3	1.0	169.5	64.9	234.4
Japan (JPN)	161.2	0.0	32.9	-0.1	1.9	-5.5	-1.2	-2.7	4.4	-4.6	0.2	-6.0	-0.5	180.0	-47.3	132.7
South Korea (KOR)	17.4	19.0	0.0	0.0	1.4	2.9	0.4	-0.1	2.6	9.8	0.9	5.5	0.9	60.7	4.8	65.4
Brunei (BRN)	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.2	-0.1	0.1
Indonesia (IDN)	6.5	0.5	1.6	0.0	0.0	0.0	-0.2	0.0	1.5	-0.1	0.0	1.1	0.1	10.8	1.8	12.6
Malaysia (MYS)	9.3	-1.1	1.0	0.0	-0.2	0.0	-0.3	0.0	1.3	-0.8	-0.1	0.0	0.0	9.1	3.2	12.3
Philippines (PHL)	3.3	-0.3	0.7	0.0	0.0	0.1	0.0	0.0	1.5	0.0	0.0	0.0	0.0	5.2	1.6	6.8
Singapore (SGP)	1.2	0.1	0.5	-0.1	1.0	-3.0	-0.1	0.0	0.8	-1.6	0.0	-0.1	0.0	-1.3	-1.2	-2.5
Thailand (THA)	9.5	1.9	1.8	0.1	0.5	0.5	0.1	0.3	0.0	0.4	0.7	0.5	0.3	16.7	11.1	27.8
Vietnam (VNM)	3.8	-1.3	3.1	0.0	0.1	-0.2	0.5	0.1	0.9	0.0	0.5	0.1	0.0	7.5	8.2	15.7
Cambodia, Lao, Myanmar (CLM)	0.8	-0.1	0.5	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	1.5	2.7	4.2
Australia (AUS)	-0.2	0.9	3.2	0.0	0.7	-0.2	0.0	0.0	0.2	-0.4	0.0	0.0	-0.3	3.9	-0.6	3.3
New Zealand (NZL)	0.1	0.6	0.9	0.0	0.1	0.0	-0.1	0.0	0.1	0.0	0.0	-0.2	0.0	1.3	-0.3	1.0
RCEP	212.9	109.7	55.3	0.1	10.3	15.6	6.0	-2.2	26.6	18.8	4.6	6.0	1.4	**465.2**	**48.6**	**513.8**
Not RCEP	13.6	18.8	8.9	0.0	1.5	-4.0	0.3	0.9	0.0	-4.1	-0.7	-3.1	-0.5	**31.8**	**-49.4**	**-17.6**
Total	226.5	128.5	64.2	0.1	11.9	11.7	6.3	-1.3	26.6	14.8	3.9	2.9	0.9	**497.0**	**-0.8**	**496.2**

Source: Author's illustration based on Park et al. (2021)

Observing the single countries, we see that the large impact projected for RCEP's economic giants China, Japan and South Korea is reflected by the estimation results. Especially the two trading relations of China and Japan as well as Japan and South Korea will see rising trade volume. Exports from China to Japan will rise by $89.5 bn (25.3 percent) and conversely, exports from Japan to China will rise by $161.2 bn (66.1 percent) while exports from Japan to South Korea are estimated to rise by $32.9 bn (52.3 percent) and exports from South Korea to Japan by $19.0 bn (35.0 percent). In addition, Table 3.1 depicts the dominating impact of trade changes for these three nations in two ways. On the one hand, small changes in trade are projected between ASEAN states in the middle rows and columns, which also reflects the success of ASEAN trade provisions existing prior to RCEP. On the other hand, the incremental changes in export volumes for the trading relations of China, Japan and South Korea with the other RCEP member states are relatively larger and partly exhibit significant changes, mostly increasing trade. Exports from China to

[7]Abbreviations here and in the following based on ISO 3166-1 country codes, except for CLM in this figure, which is the sum of Cambodia (KHM), Lao (LAO) and Myanmar (MMR).

Malaysia, for instance, are estimated to rise by $21.1 bn (24.0 percent). Also New Zealand benefits from RCEP in terms of trade volume as can be seen by rising exports to Japan ($0.6 bn and 16.6 percent) and South Korea ($0.9 bn and 53.1 percent).

Table 3.2: Global export effects by 2030 resulting from RCEP and CPTPP (in $ bn)

	2030 Exports	Incremental exports ($ bn)			Incremental exports (%)		
		US-China trade war	CPTPP	RCEP	US-China trade war	CPTPP	RCEP
Americas	**7,068**	**-379.0**	**78.0**	**-4.0**	**-5.4**	**1.1**	**-0.1**
Canada	835	8.0	40.0	-1.0	1.0	4.8	-0.1
Chile	147	-2.0	6.0	-1.0	-1.2	4.4	-0.4
Colombia	120	-1.0	0.0	0.0	-0.5	0.1	0.0
Mexico	670	32.0	25.0	-1.0	4.8	3.8	-0.2
Peru	135	-1.0	12.0	0.0	-0.6	9.2	-0.2
US	3,906	-411.0	-8.0	-2.0	-10.5	-0.2	-0.1
Latin Amercia NIE	1,255	-6.0	2.0	1.0	-0.4	0.1	0.1
Asia	**12,905**	**-522.0**	**187.0**	**496.0**	**-4.0**	**1.4**	**3.8**
Brunei	16	0.0	1.0	0.0	-1.6	3.6	0.6
China	4,976	-506.0	-6.0	234.0	-10.2	-0.1	4.7
Hong Kong, China	357	-11.0	1.0	-1.0	-3.0	0.3	-0.4
India	1,360	0.0	-3.0	-5.0	0.0	-0.2	-0.4
Indonesia	446	-2.0	-3.0	13.0	-0.5	-0.6	2.8
Japan	1,190	0.0	100.0	133.0	0.0	8.4	11.2
South Korea	1,089	0.0	-6.0	65.0	0.0	-0.5	6.0
Malaysia	491	3.0	45.0	12.0	0.7	9.3	2.5
Philippines	184	1.0	0.0	7.0	0.7	-0.1	3.7
Singapore	470	-2.0	30.0	-2.0	-0.4	6.4	-0.5
Taipei, China	506	-4.0	0.0	-8.0	-0.8	0.0	-1.5
Thailand	561	3.0	-7.0	28.0	0.6	-1.2	4.9
Vietnam	357	2.0	35.0	16.0	0.4	9.7	4.4
Other ASEAN	93	0.0	0.0	4.0	-0.1	-0.5	4.5
Asia NIE	810	-7.0	1.0	1.0	-0.9	0.1	0.1
Oceania	**673**	**-10.0**	**29.0**	**4.0**	**-1.4**	**4.3**	**0.6**
Australia	589	-9.0	24.0	3.0	-1.5	4.0	0.6
New Zealand	84	-1.0	5.0	1.0	-0.9	5.9	1.2
Rest of the World	**15,503**	**-143.0**	**19.0**	**0.0**	**-0.9**	**0.1**	**0.0**
Africa (Sub-Sahara)	883	-6.0	1.0	1.0	-0.7	0.1	0.1
Europe	9,706	-76.0	10.0	-6.0	-0.8	0.1	-0.1
EMENA	4,021	-52.0	6.0	4.0	-1.3	0.1	0.1
Russia	851	-9.0	1.0	1.0	-1.0	0.1	0.1
Others	43	0.0	0.0	0.0	-0.7	0.4	-0.1
WORLD	**36,149**	**-1053.0**	**312.0**	**496.0**	**-2.9**	**0.9**	**1.4**
RCEP	**10,545**	**-510.0**	**217.0**	**514.0**	**-4.8**	**2.1**	**4.9**

Source: Author's illustration based on Park et al. (2021)

Table 3.2 illustrates these export changes together with those of the CPTPP and adds the effect of the US-China trade war, which persists even in 2023 as the majority of the tariffs that were imposed during the Trump administration in the USA remain in place under the Biden administration (BBC News, 2023). Exports for 2030 are estimated as a baseline

scenario without either of the three following policy scenarios in place and depicted in the second column. Based on this, the US-China trade war, CPTPP and RCEP are shown in sequential order each adding their incremental effect to the previous policies. Hence, the CPTPP incremental effect assumes the US-China trade war to remain in place until 2030, a scenario that the developments of the past years have made increasingly likely, while the RCEP incremental effect assumes both previous policies in place, following the logic applied by Park et al. (2021).

Concerning world trade effects, the US-China trade war has the largest impact, reducing global exports by $1,053 bn or 2.9 percent. The CPTPP generates $312 bn in additional exports by 2030 and RCEP adds $496 bn, therefore jointly almost offsetting the impact of the trade war. This shows the significance of a trade war between two of the world's economically largest countries. Moreover, we see that RCEP's provisions are estimated to translate into significantly more added exports than those of the CPTPP.

On country-level, Table 3.2 exhibits the large losses of trade for the USA and China, both estimated to experience small negative trade losses due to CPTPP, while China benefits significantly (and relatively the most) from RCEP with an estimated rise in exports of $234 bn, thus recapturing approximately half of its trade war loss. Furthermore, it becomes apparent that ASEAN members are estimated to benefit from the trade war with additional export trade worth several billions, even though a small effect in relative terms. Europe is estimated to generate additional exports due to CPTPP ($10 bn) and lose export trade from RCEP ($6 bn). Even though this suggests a minor impact on Europe, large positive and large negative effects for different nations might cancel each other out. The same logic applies to the industry-level.

In addition, Japan benefits most from all three trade scenarios together (in absolute terms and in the context of this analysis), gaining substantially from both CPTPP and RCEP, while not affected significantly from the US-China trade war. The USA, on the other hand, loses the most trade and does so from all three policies, although influenced by the two FTAs merely to a limited extent.

Income and labour market effects

Table 3.3 shows the effects on income, illustrating that the three policies are similar in magnitude compared with their trade effect. RCEP is able to lift global income by 0.2

percent by 2030 and RCEP members' income by 0.6 percent. Moreover, RCEP has a significantly larger (positive) effect on world income than the CPTPP with added $263 bn in income on top of the $188 bn added by the CPTPP. We also see similar effects on country-level. Europe is estimated to see additional income of $14 bn by each of the two FTAs while losing $12 bn due to the US-China trade war.

Table 3.3: Global income effects by 2030 resulting from RCEP and CPTPP (in $ bn)

	2030 Exports	Incremental income ($ bn)			Incremental income (%)		
		US-China trade war	CPTPP	RCEP	US-China trade war	CPTPP	RCEP
Americas	**39,569**	**6.0**	**60.0**	**3.0**	**0.0**	**0.2**	**0.0**
Canada	2,717	6.0	26.0	1.0	0.2	1.0	0.0
Chile	463	-1.0	4.0	0.0	-0.2	0.8	0.0
Colombia	684	1.0	0.0	0.0	0.1	0.0	0.0
Mexico	2,169	29.0	21.0	1.0	1.3	1.0	0.0
Peru	442	1.0	12.0	0.0	0.2	2.6	0.0
US	25,754	-41.0	-4.0	0.0	-0.2	0.0	0.0
Latin Amercia NIE	7,341	11.0	1.0	1.0	0.1	0.0	0.0
Asia	**50,659**	**-490.0**	**91.0**	**234.0**	**-1.0**	**0.2**	**0.5**
Brunei	31	0.0	1.0	0.0	-1.3	3.0	0.5
China	27,839	-515.0	-14.0	127.0	-1.9	-0.1	0.5
Hong Kong, China	461	-25.0	2.0	2.0	-5.4	0.4	0.4
India	5,487	17.0	-5.0	-7.0	0.3	-0.1	-0.1
Indonesia	2,192	3.0	-2.0	4.0	0.2	-0.1	0.2
Japan	4,924	7.0	57.0	60.0	0.1	1.2	1.2
South Korea	2,243	7.0	-4.0	28.0	0.3	-0.2	1.3
Malaysia	675	4.0	29.0	7.0	0.6	4.4	1.0
Philippines	680	3.0	0.0	3.0	0.4	-0.1	0.4
Singapore	485	-3.0	15.0	0.0	-0.7	3.1	0.1
Taipei, China	776	0.0	0.0	-4.0	0.0	0.0	-0.5
Thailand	812	6.0	-5.0	7.0	0.7	-0.7	0.9
Vietnam	497	5.0	17.0	5.0	1.0	3.4	1.0
Other ASEAN	283	1.0	0.0	2.0	0.3	-0.1	0.6
Asia NIE	3,272	2.0	0.0	0.0	0.1	0.0	0.0
Oceania	**2,854**	**-2.0**	**19.0**	**2.0**	**-0.1**	**0.7**	**0.1**
Australia	2,590	-2.0	15.0	2.0	-0.1	0.6	0.1
New Zealand	264	0.0	4.0	1.0	0.1	1.4	0.3
Rest of the World	**40,720**	**-28.0**	**19.0**	**24.0**	**-0.1**	**0.1**	**0.1**
Africa (Sub-Sahara)	4,068	4.0	0.0	1.0	0.1	0.0	0.0
Europe	23,189	-12.0	14.0	14.0	-0.1	0.1	0.1
EMENA	10,001	-17.0	4.0	7.0	-0.2	0.0	0.1
Russia	3,371	-3.0	1.0	2.0	-0.1	0.0	0.0
Others	90	0.0	0.0	0.0	0.5	0.1	0.1
WORLD	**133,801**	**-514.0**	**188.0**	**263.0**	**-0.4**	**0.1**	**0.2**
RCEP	**43,516**	**-486.0**	**113.0**	**245.0**	**-1.1**	**0.3**	**0.6**

Source: Author's illustration based on Park et al. (2021)

Park et al. (2021) incorporate labour market effects into their analysis and report significant wage increases, especially due to CPTPP and RCEP and less because of the impact of the US-China trade war. By 2030, skilled workers' wages rise by between 121 to 330 percent

while unskilled workers' wages increase by between 122 to 227 percent. The difference is explained by a higher sensitivity of skilled workers' wages to rates of investment and productivity growth (Park et al., 2021). In addition, the results show a tendency of more advanced economies to see wage increases at the lower end of the range versus higher rises for less advanced and more rapidly developing economies. On country-level, the distribution of effects on wages is comparable to those on trade and income. While China and Hong Kong (not an RCEP member as of August 2023) see overall losses, especially Vietnam, Malaysia, Brunei, Japan, South Korea as well as New Zealand see large overall wage increases of between two and six percent, with similar effects for skilled and unskilled workers (Park et al., 2021). Their analysis also shows that apart from China and Hong Kong, many RCEP economies are less impacted by the US-China trade war in terms of wages as they depend on trade with China but at the same time face its' competition in the global economy (Park et al., 2021). This is in line with findings on trade and income. Furthermore, RCEP is estimated to create approximately 2.6 million jobs, while the CPTPP is reported to add 1.5 million jobs to global employment and the US-China trade war to diminish three million jobs (Park et al., 2021).

Comparison of results

The literature regarding the analysis of the impact of RCEP by means of CGE model analysis is limited. The results of key studies from recent years are compared in Table 3.4 with a focus on trade and income, as trade policy per se is not expected to significantly impact employment in the long run (Krugman, 1993). We see that despite some differences the studies observe regarding methodology, data and assumptions the results are largely consistent concerning both trade and income. For a more detailed overview including model specifications regarding tariff liberalisations and other trade barrier reductions see Table B3 in Appendix B.

Estrades et al. (2022) find that RCEP exports increase by 5.2 percent by 2035 due to RCEP, if productivity gains are included. Moreover, intra-RCEP trade is estimated to increase by 12.3 percent and real income is set to rise by approximately 2.5 percent by 2035. When comparing their results to other studies and thus estimating until 2030 and without productivity gains, Estrades et al. (2022) estimate RCEP members' real income to rise by 0.41 percent, including reductions in tariffs and NTB as well as harmonised rules of origin. Petri and Plummer (2020) find real income to rise by 0.38 percent, accounting for

Table 3.4: Comparison of results: effects of RCEP and CPTPP on trade and income[8]

	FTA	Launch date for estim-ation	Real income effects in 2030 (% changes)				Exports effects in 2030 (% changes)			
			CPTPP members	RCEP members	China	World	CPTPP members	RCEP members	China	World
Park, Petri and Plummer (2021)	**RCEP**	2020		**0.56**	**0.46**	**0.20**		**4.9**	**4.7**	**1.4**
	CPTPP	2018		**0.26**	**0.05**	**0.14**		**2.1**	**0.1**	**0.9**
Petri and Plummer (2020)	**RCEP**	2020		**0.43**	**0.36**	**0.16**		**4.92**	**4.90**	**1.39**
	CPTPP	2018		**0.16**	**0.10**	**0.09**		**1.93**	**0.18**	**0.79**
Ferrantino, Maliszewska and Taran (2020)	**RCEP***	2018	**1.96***** 0.9 **1.4** (incl. product-ivity kick)	2.1 **4.5** (incl. product-ivity kick) **0.32*****	**2.07***** **0.02*****	**0.62***** **0.11*****		4.9 **7.8** (incl. product-ivity kick)	4.2 **8.0** (incl. product-ivity kick)	1.4 **2.6** (incl. product-ivity kick)
	CPTPP	2018					2.8 **3.4** (incl. product-ivity kick)		-0.1 0.0 (incl. product-ivity kick)	0.3 **0.4** (incl. product-ivity kick)
Estrades, Maliszewska, Osorio-Rodarte, Pereira and Filipa (2022)	**RCEP**	2021	0.34 (incl. rules of origin) **0.55** (incl. product-ivity kick)	0.41** (incl. rules of origin) **1.75**** (incl. product-ivity kick)	0.27 (incl. rules of origin) **2.31** (incl. product-ivity kick)	0.11 (incl. rules of origin) **0.52** (incl. product-ivity kick)		3.7 (incl. rules of origin) **5.2** (incl. product-ivity kick) ****	2.4 (incl. rules of origin) **4.0** (incl. product-ivity kick) ****	
Itakura (2022)	**RCEP**	2022		0.4 (incl. trade cost liberalization) **0.6** (incl. investment commitments) *****	0.3 (incl. trade cost liberalization) **0.5** (incl. investment commitments) *****	0.1 (incl. trade cost liberalization) **0.0** (incl. investment commitments) *****		3.0 (incl. trade cost liberalization) **4.2** (incl. investment commitments)	3.0 (incl. trade cost liberalization) **3.9** (incl. investment commitments)	0.9 (incl. trade cost liberalization) **0.9** (incl. investment commitments)

Source: Author's elaboration

reductions in tariffs and NTB. Park et al. (2021) report a real income increase of up to 0.6 percent when including benefits from harmonised rules of origin. Furthermore, Ferrantino et al. (2020) estimate a rise in real income of 0.6 percent due to RCEP (although including India in the analysis) and 0.1 percent due to CPTPP. When including productivity gains, they find that income rises by up to 4.5 percent for RCEP members. Itakura (2022) incorporates ad valorem tariff equivalents for service trade, reductions in the time cost of trade as well as investment provisions and finds that RCEP raises members' export trade by 4.2 percent by 2035 while raising their welfare by 0.6 percent.

The few other studies using a CGE approach in this context find RCEP's impact on trade to go in the same direction, however, the range of empirical results is larger. For instance, Mahadevan and Nugroho (2019) find more moderate effects, pointing to existing agreements with substantial tariff reductions. Cui and Li (2021) confirm earlier research by Petri and Plummer (2020) in finding that reductions in tariff and NTB increase the GDP of ASEAN members. Li and Li (2022) point to the so-called spaghetti bowl effect of RCEP raised by Fukunaga and Ikumo (2013) and find that the impact of many different provisions regarding rules of origin and preferential treatments existing in the region will reduce RCEP's global export effect by more than half. Furthermore, the CGE analysis conducted by the Monetary Authority of Singapore finds that tariff reductions alone lead to RCEP members' GDP to rise by 0.4 percent after 10 years (Monetary Authority of Singapore, 2021). In addition, the latter study reports income increases of 1.1 percent for members of the CPTPP and of 0.6 percent for RCEP members. Furthermore, Petri and Plummer (2023) include the effect of the recent geopolitical developments in the wake of the invasion of Russia in Ukraine and resulting effects such as higher prices for natural resources into a CGE model analysis. They find persisting negative economic effects of this shock on Southeast Asia as geopolitical interventions increase the cost of fragmented production and thereby hinder GVC trade. By 2035, global economic growth (in terms of GDP) is expected to grow 1.5 percent less than previously estimated while global income reduces by 2.2 percent (Petri and Plummer, 2023). Moreover, the analysis outlines enlarging existing FTAs like RCEP and CPTPP as viable counteractions as they promote GVC trade, which is in line with the CGE analysis of Fan et al. (2023) who find that RCEP increases vertical specialisation.

Estrades et al. (2022) expand their analysis of RCEP's impact to the sector-level, reporting that agricultural and manufacturing industries' exports will rise significantly. They find that the sectors of meat products, food and beverages, textiles, wearing apparel, motor vehicles, non-metallic minerals as well as crops can expect substantial export increases of between four and 16 percent by 2035, which is largely linked to RCEP's tariff reductions

[8]The scenarios employed include tariff reductions, preferential NTB reductions as well as MFN NTB reductions. The rules of origin scenario follows the assumption of a one percent reduction in trade costs among RCEP members in addition to the other liberalisations. The productivity scenario assumes an increase in productivity in relation to the tariff reduction in addition to the other liberalisations incl. the rules of origin additions (Estrades et al., 2022). The trade cost liberalisation scenario includes a 20 percent reduction of ad valorem tariff equivalents of trade in services over 10 years, while the investment commitments scenario additionally incorporates RCEP's investment provisions (see scenarios S2, S3 and S4 in Itakura, 2022). * includes India ** excludes Brunei and Myanmar *** as reported in Estrades et al. (2022) **** effects estimated for 2035 ***** effect on welfare (households' utility).

(including the effect of increased productivity and relative to the baseline scenario, i.e. without the effects of the US-China trade war and the CPTPP incorporated). In absolute terms, the sectors expanding most are related to manufacturing activities, namely electrical equipment and machinery; chemicals, rubber and plastics; metals; motor vehicles and parts, food and beverages as well as wearing apparel and leather (Estrades et al., 2022). This finding is consistent with those of Park et al. (2021), who also find a significant effect on traded service activities. By 2035, the electrical equipment and machinery sector is expected to increase by far the most with additional trade of approximately $208 bn from increased intra-RCEP trade (approximately $190 bn) and additional exports to non-RCEP countries (approximately $18 bn), while imports from non-RCEP countries contract by a substantial $45 bn (approximately) (Estrades et al., 2022). Thus, an additional net export trade of approximately $163 bn. The other top expanding industries are estimated to grow by additional exports of between $19 bn and $55 bn. In many sectors, the trade expansion comes from additional intra-RCEP trade.

The changes across industries differ among RCEP members. While overall RCEP's impact is positive across sectors, there are some that contract in certain countries, despite overall expansion. The electrical equipment and machinery industry, for instance, is reported to increase substantially in China with 4.1 percent additional output by 2035, Vietnam (+12.1 percent) and Malaysia (+6,3 percent), while at the same time contracting in Australia and New Zealand with a 5.2 percent reduction in output for these two countries, on average (Estrades et al., 2022). Two effects lead to this distribution of changes in output and trade. In some sectors, the trade expansion in certain countries leads to a contraction in other countries, an intra-industry effect. The magnitude of changes in the different countries might still cause a strong overall expansion, such as estimated for the electrical equipment and machinery sector. Moreover, the expansion and contraction of industries has effects on other industries that then contract or expand, an inter-industry effect. Furthermore, these dependencies occur for intra-RCEP trade just as for trade between members and non-members of RCEP (inter-RCEP trade), making the changes in output and trade multi-dimensional in their causality.

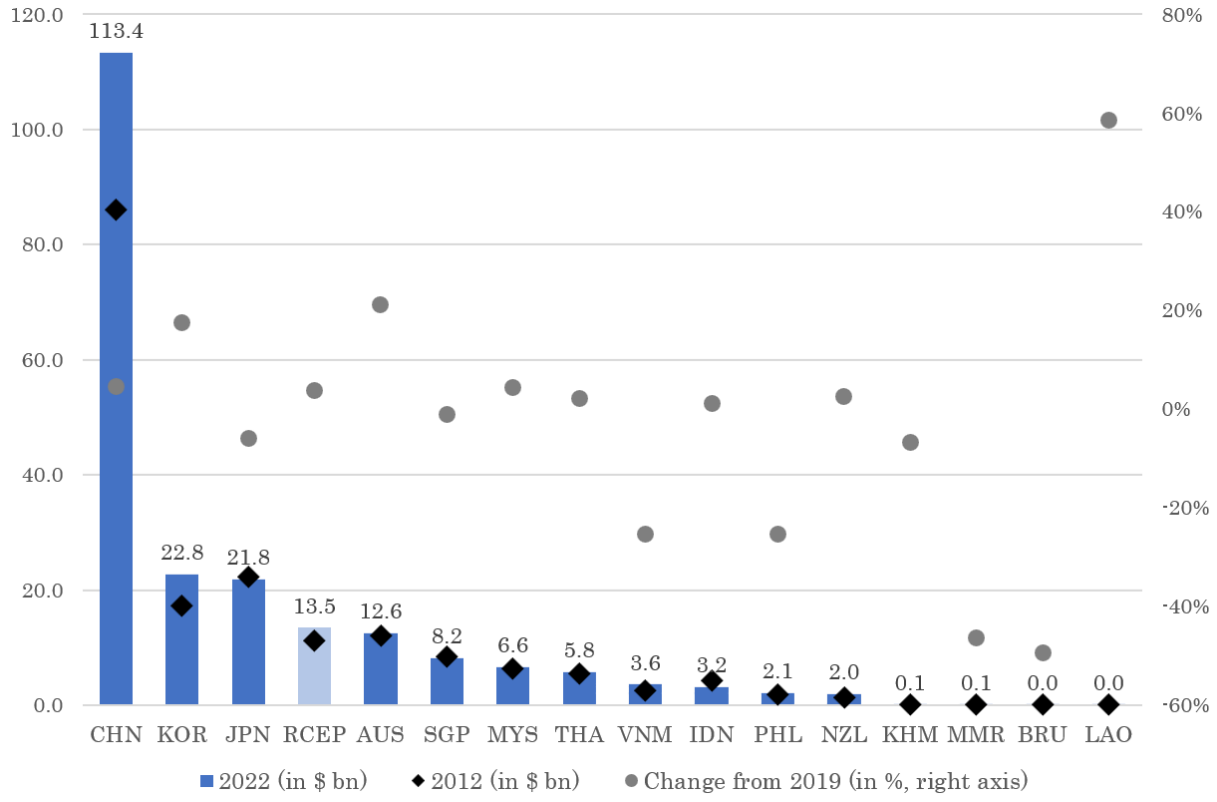
3.4 The effect of RCEP on the German economy

This section focusses on the trade relationship and effects of RCEP on Germany. Besides depicting imports and exports on country- and sector-level, it answers questions such as how Germany is tied into RCEP GVCs, how large the shares of domestic and foreign value-added are and how this has changed over time.

3.4.1 Relevant trade patterns

RCEP is a major trading partner for Germany with 19.8 percent of its imports coming from and 12.1 percent of its exports going to the region in 2022 (UN Comtrade, 2023). In absolute terms, this equals approximately $313 bn in imports and $202 bn in exports. Thus, Germany has a significant trade deficit with RCEP as a cluster of its members.

Figure 3.4: Germany's goods exports to RCEP states in 2022 and over time

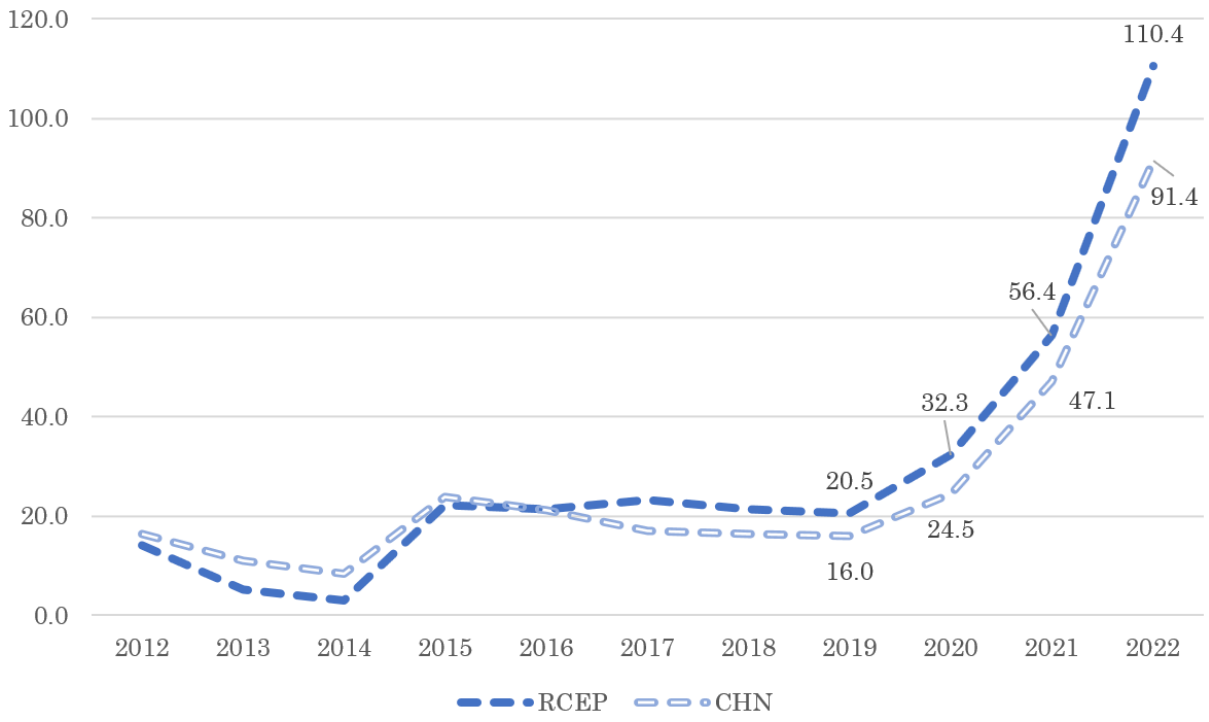


Source: Author's illustration based on UN Comtrade (2023)

China is by far the largest trading partner and accounts for 13.0 percent of Germany's imports and 6.8 percent of its exports in 2022. This makes China Germany's largest

import market with $205 bn worth of goods before the Netherlands ($119 bn) and the USA ($98 bn). Regarding Germany's export markets, China ranks fourth with goods exports worth $113 bn after the USA ($166 bn), France ($122 bn) and the Netherlands ($114 bn) (UN Comtrade, 2023). Figure 3.4 illustrates Germany's goods exports to RCEP members, reflecting China's significant dominance in this regard. Nevertheless, RCEP member states without China constitute a substantial trading partner on their own, accounting for 6.8 percent of Germany's total imports and 5.3 percent of its exports in 2022. Apart from China, South Korea and Japan are the largest trading markets for Germany among RCEP members. Even though they are not among its top ten trading partners, Germany exported goods worth approximately $22 bn to each while importing goods worth $27 bn from Japan and $14 bn from South Korea in 2022 (UN Comtrade, 2023).

Figure 3.5: Germany's trade deficit with RCEP states, 2012-2022 (in $ bn)

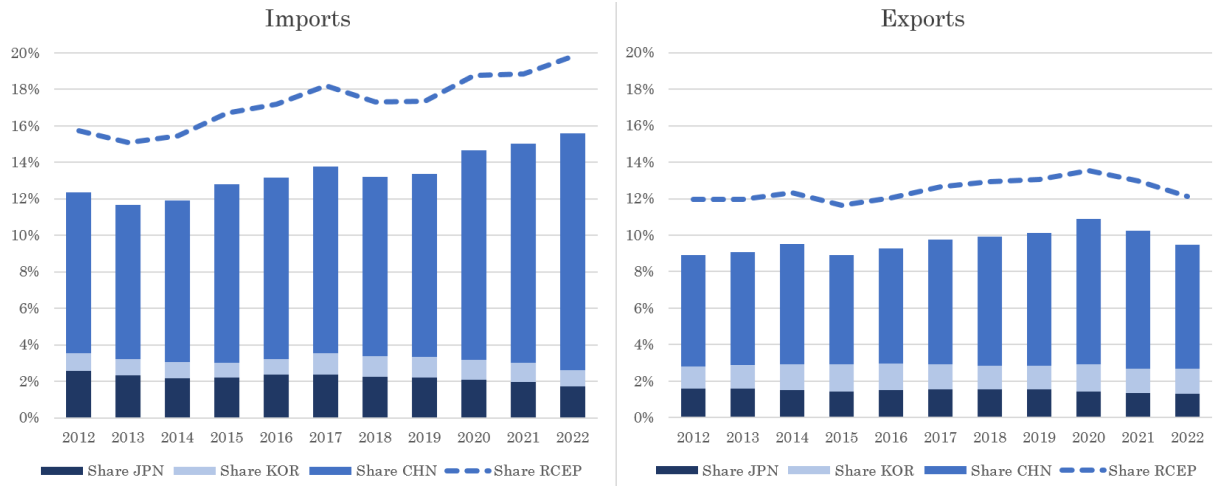


Source: Author's illustration based on UN Comtrade (2023)

Over time, RCEP has become a more important trading partner for Germany, both in absolute and relative terms as well as regarding both imports and exports. Between 2012 and 2022, Germany's imports from the region increased by $130 bn while its exports rose by $34 bn. The COVID-19 pandemic has had a significant impact on supply chains and trade volumes. Observing the pre-COVID-19 comparison, depicted by the right-hand scale in Figure 3.4, we see a mixed picture. While some of the smaller trading partners exhibit large

changes in either direction, most trading relationships grew slightly while exports to South Korea and Australia increased substantially by 18 and 21 percent, respectively. Overall, Germany's goods exports to the region rose by four percent, whereas from 2019 to 2020 exports declined by four percent (UN Comtrade, 2023). The COVID-19 pandemic seems to have caused Germany's trade deficit with RCEP countries to increase substantially, as can be seen by Figure 3.5.

Figure 3.6: Share of Germany's imports and exports with RCEP over time



Source: Author's illustration based on UN Comtrade (2023)

While remaining comparatively steady until 2019, Germany's trade deficit with RCEP increased exponentially thereafter, rising from approximately $20 bn in 2019 to $110 bn in 2022, of which $91 bn or 81 percent originate from trade with China. Regarding world trade, by contrast, Germany has a trade surplus of approximately $88 bn in 2022, although this has been decreasing in recent years and stood at $253 bn in 2019 (UN Comtrade, 2023).

Figure 3.6 depicts the relative share of RCEP as well as China, Japan and South Korea in Germany's foreign trade of goods over time. Overall, the relative importance of RCEP increased over time, regarding both imports and exports, despite the latter losing share in the past two years. Looking at Germany's three most important trading partners among RCEP members, we see that the import and export shares of Japan and South Korea remain almost constant over time. One and two percent of Germany's imports come from, and exports go to South Korea and Japan, respectively. This is different for China and as becomes apparent changes in shares regarding Germany's trade with RCEP as a cluster are mainly due to changes in trade with China.

3.4.2 Analysis on industry-level

We analyse the top three industries of trade between Germany and RCEP regarding gross imports and exports, thus including both intermediate and final goods and services. For these industries, Table 3.5 shows the trade between Germany and RCEP member states as well as, for the purpose of putting the absolute numbers into perspective, trade with the USA, EU27 (see Appendix A for a list of EU27 members) and the world in total. Germany's top three export industries of trade with RCEP also constitute its top three overall export industries in the same order. Concerning imports, there are discrepancies in this regard as, for instance, the mining and quarrying, energy producing products industry is one of its largest import sectors, for which however, RCEP plays only a minor role.

We follow the UN's International Standard Industrial Classification (ISIC) of economic activities (UN, 2008) and analyse based on the most specific differentiation of industries the TiVA database of the Organisation for Economic Co-operation and Development (OECD) allows for (OECD, 2023a)[9].

Imports

Concerning trade with RCEP, Germany imports most from the manufacturing industry referred to as computer, electronic and optical products (D26), in the following synonymously referred to as the electronic industry, with an import value of $39.2 bn in 2018. As Table 3.5 illustrates, the majority of this relates to imports from China ($23.4 bn), while more than 80 percent result from imports from China, Japan and South Korea taken together. Of all of Germany's imports in this industry, 50 percent come from RCEP members and 30 percent from China alone. Moreover, imports in the electronic industry from RCEP members account for 22 percent of total RCEP imports as well as six percent of Germany's worldwide imports, making this its third largest import industry in total. The textiles, wearing apparel, leather and related products industry (D13T15), in the following synonymously referred to as the textiles industry, is Germany's second largest import industry with an import value of $15.1 bn in 2018. This manufacturing sector accounts for eight percent of Germany's RCEP imports and three percent of its total imports. Of all of Germany's imports in this industry, 40 percent come from RCEP members and 29 percent from China alone. The sector referred to as wholesale and retail

[9]Trade data in the remainder of this chapter is taken from this database, unless stated differently.

trade; repair of motor vehicles (D45T47), in the following synonymously referred to as the automotive service industry, is Germany's third largest RCEP import sector with an import value of $14.1 bn in 2018, which equals eight percent of all imports from RCEP members. Moreover, this is Germany's overall largest import industry, representing ten percent of its worldwide imports in 2018. Imports from RCEP account for 11 percent of this trade while most originates from EU27 ($74.6 bn). Taken together, Germany's worldwide imports from these three industries make up 18 percent of its total imports, which amount to $1,331 bn in 2018, indicating the relevance of these sectors. Its imports from these industries from RCEP members alone account for five percent of Germany's worldwide imports. Concerning imports from RCEP, 38 percent come from these top three sectors.

Exports

The motor vehicles, trailers and semi-trailers industry (D29), in the following synonymously referred to as the automotive industry, is Germany's largest export industry overall (16 percent of total exports worldwide) as well as specifically regarding trade with RCEP (17 percent of total RCEP exports). In 2018, Germany exported goods worth $41.4 bn to RCEP members in this industry, approximately 90 percent of which was exported to China, Japan, South Korea and Australia. As Table 3.5 shows, with respect to trade with RCEP, Germany's third largest import industry D45T47 (wholesale and retail trade; repair of motor vehicles) is also its second largest export industry, accounting for nine percent of its total RCEP exports, while it is closely related to industry D29. Moreover, this is equal to 15 percent of Germany's worldwide exports in wholesale and retail trade; repair of motor vehicles, a sector which itself represents approximately nine percent of Germany's total exports in 2018.

Furthermore, the electronic industry (D26) is not only Germany's largest import sector regarding trade with RCEP member states, but also its third largest export sector. In 2018, Germany exported $16.1 bn to the region, accounting for seven percent of its total RCEP trade. With respect to Germany's total exports in this industry, 22 percent was exported to RCEP. Taken together, Germany's exports to RCEP members in these three industries account for one third of its total exports to RCEP or five percent of Germany's worldwide exports in 2018. In addition, its worldwide exports (including RCEP) from

Table 3.5: Germany's largest industries of international trade - imports and exports in 2018 (in $ bn)

	Gross imports			Gross exports		
	D26	**D13T15**	**D45T47**	**D29**	**D45T47**	**D26**
	Computer, electronic and optical products	Textiles, wearing apparel, leather and related products	Wholesale and retail trade; repair of motor vehicles	Motor vehicles, trailers and semi-trailers	Wholesale and retail trade; repair of motor vehicles	Computer, electronic and optical products
CHN	23.4	11.2	5.5	20.2	10.6	8.4
JPN	4.5	0.1	3.1	8.2	3.5	2.0
KOR	4.0	0.1	0.8	5.4	2.2	2.2
MYS	2.3	0.1	0.5	1.5	0.6	0.8
AUS	0.1	0.0	0.4	3.0	1.2	0.7
SGP	1.2	0.0	1.7	1.3	0.5	0.5
THA	1.4	0.4	0.8	0.9	0.8	0.7
VNM	0.8	1.8	0.3	0.2	0.6	0.1
IDN	0.4	0.6	0.4	0.3	0.5	0.3
PHL	1.2	0.1	0.3	0.1	0.3	0.4
NZL	0.0	0.0	0.1	0.4	0.2	0.1
KHM	0.0	0.4	0.1	0.0	0.0	0.0
MMR	0.0	0.3	0.1	0.0	0.0	0.0
LAO	0.0	0.0	0.0	0.0	0.0	0.0
BRU	0.0	0.0	0.0	0.0	0.0	0.0
RCEP	**39.2**	**15.1**	**14.1**	**41.4**	**21.1**	**16.1**
USA	6.5	0.3	12.0	28.5	13.1	8.0
EU27	21.0	10.4	74.6	108.9	70.1	29.9
World	77.8	38.2	130.1	250.4	145.2	72.7

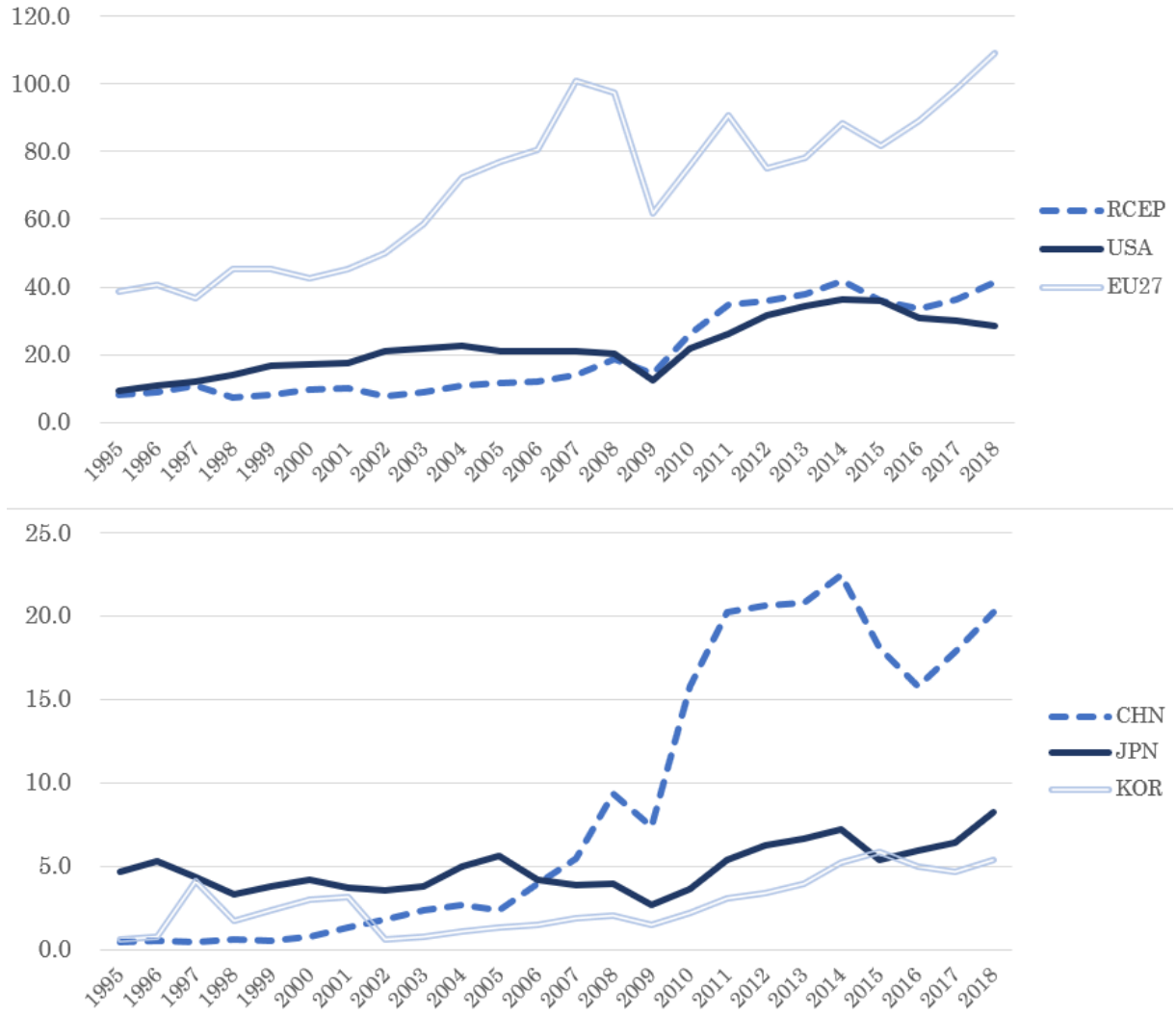
Source: Author's illustration based on OECD (2023a)

these three sectors together make up 30 percent of Germany's total exports ($1,548 bn in 2018), showing their relevance for its world trade.

Development over time

We now examine how Germany's trade with RCEP has changed over time in its most important import and export industries. Germany's largest export sector, the automotive industry (D29), exhibits an increasing amount of trade from Germany to its trading partners over time. The upper part of Figure 3.7 depicts exports to RCEP members,

Figure 3.7: Germany's exports in the automotive industry (D29) over time (in $ bn)



the USA as well as EU27 states, which together account for more than 70 percent of Germany's exports in this industry. Trade with RCEP remained relatively constant and increased especially as of 2010, after the global financial crisis. The lower part of Figure 3.7 shows that this increase is mainly due to rising exports to China, which almost tripled between 2009 and 2011 and remained high afterwards. This growth is also the main driving force behind RCEP's growing importance as an export market for Germany in this industry over time, which increased from 11 percent in 2009 to 17 percent in 2018, approximately half of which is attributable to exports to China. In addition, the D29 industry is closely connected to the automotive service sector (D45T47) as these services form part of buying, selling and using D29 products, making this part of Germany's economy even more important in this context.

Regarding trade in Germany's largest import sector, the electronic industry, RCEP plays a more important role. Figure 3.8 follows the logic of Figure 3.7 and depicts Germany's trade in the electronic industry (D26) over time. In this case, for both imports and exports due to the significance of the trade volumes.

Figure 3.8: Germany's trade in the electronic industry (D26) over time (in $ bn)

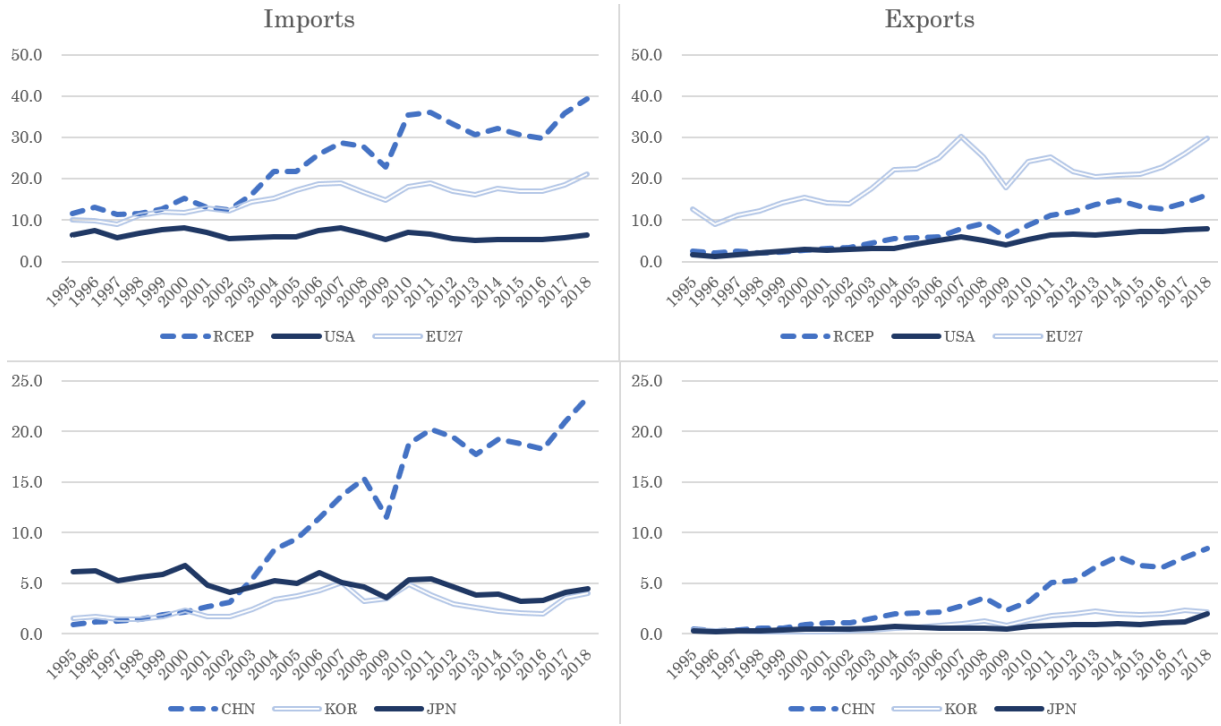


Figure 3.8 illustrates that Germany imports almost $40 bn from RCEP, which represents 50 percent of its total imports in this industry, and that this increased significantly over the past two decades. This growth is in most parts attributable to imports from China, which for 2018 represents 30 percent of Germany's world imports in this industry, or 60 percent of its RCEP imports. Imports from Malaysia, Thailand, Philippines and Vietnam also increased over time and account for approximately $5.7 bn worth of imports in 2018. Concerning Germany's exports in the electronic industry RCEP plays an import role with trade worth more than $16 bn in 2018, however, is the destination of less exports than EU27 with more than $29 bn in exports. While Germany's exports to all three destinations increased steadily over time, export growth to RCEP members is again largely attributable to exports to China, which account for more than 50 percent of exports to RCEP.

The discussed trade patterns suggest that the substantial trade volume between Germany

and RCEP member states, paired with the political and economic consequences of RCEP, can lead to large trade diversion effects. Overall, the electronic industry is most important for Germany's foreign trade with RCEP in both relative and absolute terms, accounting for 37 percent of its foreign trade in this sector. As discussed in the previous chapter, it is essential to analyse value-added in trade and GVCs to obtain a more accurate picture of reality. Therefore, a specific analysis of backward and forward linkages based on TiVA data is applied in the following, analysing Germany's integration into RCEP trade and value chains, in order to better understand the potential effects, preferential political actions as well as opportunities for investment.

3.4.3 The computer, electronic and optical products industry

Products of the industry

The manufacturing industry of computer, electronic and optical products is classified as D26 in the UN ISIC of economic activities (UN, 2008). It includes the production of electronic components, such as microprocessors or integrated circuits, the manufacture of computers and computer peripherals, such as printers, monitors, virtual reality helmets, etc., as well as communications equipment such as smartphones or radio equipment. The division also contains the production of consumer electronics, measuring, testing and navigating equipment, irradiation and electromedical equipment as well as the production of magnetic and optical media. In addition, the D26 division includes the manufacture of components for such products. Its production processes are highly specialised and often characterised by integrated circuits and miniaturisation technologies (UN, 2008).

Backward linkages: the import content of Germany's exports

This paragraph analyses the import content of Germany's exports that is related to RCEP, focussing on the D26 industry. It is a foreign value-added intensity measure in the analysis of GVCs as it indicates the degree of vertical specialisation and dependence on foreign imports in the production of goods and services for exports. As becomes apparent from above, in total, Germany imports goods worth $39.2 bn in the D26 industry from RCEP in 2018 (compared with its $1,331 bn total world imports), of which around $23 bn come from China. These imports are measured in gross terms. Moreover, $16.1 bn of Germany's

total gross exports ($1,548 bn) are exported to RCEP within the electronic industry, of which $8.4 bn go to China.

D26 RCEP imports in Germany's total exports

The relation of how much of Germany's total gross exports is D26 value-added from RCEP, irrespective of the destination of these goods and services, is of primary interest in order to analyse the backward linkages with RCEP for its largest import industry. Of all of Germany's $1,548 bn exports in 2018 (including all industries and measured in gross terms), $50.9 bn is value-added from industry D26 (up from $16.4 bn in 1995). $40.2 bn of this is domestic value-added and $10.7 bn, or 21 percent, is foreign value-added. RCEP accounts for 46 percent of this foreign value-added share and thus approximately half of all D26 foreign value-added contained in Germany's exports ($4.9 bn) in 2018, while 22 percent ($2.3 bn) come from China alone. In fact, foreign value-added from China exceeds that of the USA as well as EU27 in Germany's 2018 exports (OECD, 2023a). Hence, Germany is highly dependent on foreign inputs for its D26 exports and RCEP plays a major role for this, above all China.

On a side note, in addition to its $4.9 bn value-added D26 imports from RCEP contained in its exports, Germany imports $14.5 bn from RCEP for domestic demand. Therefore, in value-added terms, a large share (approximately 25 percent) of the traded goods and services of Germany's top import industry with RCEP is eventually contained in its exports (OECD, 2023a). Over time, the D26 foreign value-added content of Germany's exports has increased both in absolute and relative terms, rising from $2.6 bn and 16 percent in 1995 to $10.7 bn and 21 percent in 2018. More importantly, RCEP's foreign value-added content in Germany's exports increased even more, rising from $0.8 bn or five percent in 1995 to $4.9 bn or ten percent in 2018 (OECD, 2023a), which constitutes a rising dependence.

D26 RCEP imports in Germany's D26 exports

Regarding the use of D26 value-added inputs from RCEP in Germany's exports, the relation of how much of this is incorporated in Germany's D26 gross exports compared with its exports in other sectors is important in understanding the degree of interdependence and vertical specialisation. Of the $50.9 bn D26 value-added content of Germany's total exports in 2018, $40.7 bn was exported within the D26 industry and is thus intra-industry

backward-linkage trade of Germany, irrespective of the originating country of these inputs at this stage (OECD, 2023a). The foreign value-added share of this is relatively low with $3.4 bn or eight percent, while the remaining 92 percent are produced domestically. Nevertheless, RCEP again accounts for a large part of the foreign value-added share with 48 percent or $1.6 bn, of which almost half originates from China (OECD, 2023a). It follows that $1.6 bn of the total $4.9 bn of value-added RCEP inputs that are contained in Germany's exports are traded within the D26 industry while the remaining $3.3 bn are exported in other industries.

The ratio of D26 value-added from RCEP in Germany's D26 exports is persistent over the past two decades with between two and four percent. Consequently, RCEP inputs are more important for Germany's exports in other industries, emphasising the degree of vertical specialisation across sectors and dependence on D26 RCEP inputs as these are mainly used for exports of other sectors. Furthermore, the fact that a large share of Germany's D26 foreign value-added content of exports originates from RCEP shows the importance of this trading relationship for this specific sector.

Total RCEP imports in Germany's D26 exports

The share of how much of Germany's D26 gross exports is value-added from RCEP from all sectors taken together is needed to understand the relevance of the D26 sector for Germany's backward linkage trade from another perspective. In 2018, Germany exported D26 goods and services worth $72.7 bn, of which by the way $16.1 bn or 22.1 percent went to RCEP (see Table 3.5), making it Germany's third largest export sector regarding trade with RCEP, as well as overall (OECD, 2023a). Of the $72.7 bn, 24 percent ($17.5 bn) are foreign value-added while RCEP value-added specifically accounts for seven percent ($5.4 bn). Hence, RCEP accounts for approximately 31 percent of foreign value-added in this context. Over time, this relation has remained relatively constant, increasing slightly, with RCEP accounting for between 19 and 31 percent of foreign value-added. It follows that for Germany's exports in the electronic industry, RCEP value-added plays a relatively less important role compared with its overall exports.

D26 RCEP imports in Germany's D29 exports

In addition, the relevance of D26 value-added from RCEP for Germany's exports within its top export industry of motor vehicles, trailers and semi-trailers (D29) indicates the

degree of vertical specialisation in this regard. Of Germany's $250.4 bn exports in the D29 industry in 2018, 27 percent ($68 bn) are foreign value-added and four percent originate from RCEP ($9.5 bn) (OECD, 2022). When filtering for D26 value-added input we see that $1.8 bn of the $250.4 bn is D26 value-added. Thus, in general, inputs from the D26 sector comprise a minor share of the required inputs for Germany's D29 exports. The RCEP share of the $1.8 bn is relatively high with 31 percent. Therefore, despite the fact that Germany is heavily reliant on foreign inputs for its top export industry, this is not the case for RCEP inputs. When looking specifically at D26 inputs in this context, however, RCEP inputs play an important role. This trend is persistent for the past two decades. Furthermore, for both aspects, China constitutes approximately half of value-added from RCEP.

Forward linkages: Germany's value-added in RCEP's exports

For the analysis of potential effects, preferential political actions as well as opportunities for investment the degree of vertical specialisation and dependence examined by means of backward linkages are more important than forward linkages. Regarding the latter, Germany's forward participation in terms of its domestic value-added in the exports of RCEP members indicate Germany's dependence on RCEP as a sales channel. Measured as a share of Germany's total world exports, 3.5 percent is German value-added embodied in exports by RCEP countries to others globally. In comparison, 0.7 percent is embodied in USA exports, 1.2 percent in China's exports and 14.1 percent in EU27 exports (OECD, 2023a).

3.5 Results and discussion

3.5.1 Overall effects

The reduction of trade barriers as a combination of tariffs, the related rules-of-origin as well as non-tariff-barriers on goods and services will result in several trade effects. Firstly, as trade barriers on goods and services traded between RCEP members fall, they replace some domestic products by more efficient products from other RCEP members (Lu, 2019). The additionally created trade flows are referred to as the trade creation effect of FTAs (Baldwin and Wyplosz, 2019). This lets us hypothesise that,

H1: RCEP members will source more goods and services from (within) the RCEP area through international trade, following the implementation of the agreement.

Secondly, the discriminatory nature of FTAs and in this case RCEP suggests that trade among RCEP members replaces trade with non-members, such as Germany, as products from the area become more efficient. This is referred to as the trade diversion effect (Baldwin and Wyplosz, 2019) and lets us hypothesise that,

H2: Exports from Germany to RCEP members will decline following the implementation of the agreement.

This corresponds to the risk for Germany losing trade relationships and market share. The three largest economies of RCEP are going to play a major role in this regard as they are Germany's most important trading partners from the area with substantial trade volume. RCEP members could shift trade with Germany to Japan or South Korea, for instance, for technically advanced products in the automotive industry as RCEP enables better market access to local manufacturers, such as Toyota, Hyundai, Nissan, Kia or Honda (Frenkel and Ngo, 2021). Thirdly, more efficient supply chains make RCEP exports more competitive on world markets and let them gain additional market shares. Even though this does not necessarily hold for each member of the agreement, it lets us hypothesise that,

H3: Exports from RCEP members to Germany will increase and acquire additional market shares following the implementation of the agreement.

Combined with H2, this causes an increasing trade deficit of Germany with RCEP. Fourthly, in accordance with H3, non-members of RCEP, such as Germany, will lose market shares, which leads us to hypothesise that,

H4: Exports from Germany to other non-members of RCEP will decline and lose market shares to RCEP members following the implementation of the agreement.

This effect also causes Germany's foreign trade balance to decrease. Nevertheless, Germany can benefit from consequences of the agreement such as the rules of origin. Some intermediate inputs from the region become cheaper for German importing companies as some producers in the RCEP region will be able to lower production costs due to economies of scale (Frenkel and Ngo, 2021). This enables lower production costs and increased competitiveness. Hence, H3 need not be viewed entirely negatively despite

contributing to an increasing trade deficit. Moreover, German companies invested in the region benefit from reduced regulatory burden more directly, as well as generally from the region's growth.

The effects from hypotheses H1 to H4 apply holding all other things constant. Despite our forecast for RCEP's effects on Germany, new FTAs, other countries joining existing FTAs as well as existing FTAs changing in scope have their own effect on world trade, just as other economic and political factors. Eventually, the size of the different effects determines the gains and losses for Germany while FDI and other forms of investment in the RCEP area can have a positive influence. Our hypotheses are, however, in line with the projections from the CGE model analysis of Park et al. (2021).

Germany's outward investments shows that China constitutes an important part of its investments, which exhibit a distribution similar to the overall trade distribution by industry for Germany's foreign trade with RCEP and China. Looking at the stock of investments, the German outward FDI stock amounts to approximately $1,613 bn at the end of 2021, of which 67 percent are investments in foreign holding companies (German Bundesbank, 2023). Based on consolidated data covering primary as well as secondary FDI, which enable identifying the final destination that chains of investment lead to, for instance running through intermediaries for tax purposes, the USA can be seen to be the destination of the largest share of the German outward investment stock with approximately $438 bn or 29 percent. This is about four times more than China, where approximately $110 bn or seven percent are invested, a similar amount as Luxembourg (approximately $117 bn) and the UK (approximately $109 bn) (German Bundesbank, 2023). In terms of FDI flows, Germany's investments into China have risen over the years and surmount to an average annual investment flow of $1.7 bn to China between 2003 and 2018 (FDI Center, 2019). Moreover, the largest investment sectors are in line with those that see the most foreign trade as Germany invested most in the chemicals, rubber and plastics industry between 2013 and 2018 (approximately $22.0 bn) followed by the automotive industry (approximately $17.4 bn) as well as the electronic industry (approximately $10.9 bn) (FDI Center, 2019).

As pointed out, Germany has a significant trade deficit with RCEP, which to approximately 80 percent results from trade with China. Hence, while Germany will benefit somewhat from the RCEP region's growth, the results show that this trade deficit is likely going to increase making Germany more dependent on RCEP inputs. Furthermore, the past

development of trade between Germany and RCEP members together with the region's development in general strongly indicate a rising trade deficit and dependence of Germany on RCEP, without taking the effects of the agreement itself into account, which are a multiplying factor for this development.

3.5.2 Industry effects

We expect the German industries analysed in 3.2 to be most affected by RCEP as, on the one hand, they are the ones with the highest trade volumes with the agreement's members (and RCEP's provisions do not apply very differently to some specific industries) as well as, on the other hand, they are among those sectors estimated to see the largest trade expansion from an RCEP-perspective. As illustrated, the D26 sector will see by far the largest contraction of RCEP imports from non-RCEP countries with approximately $45 bn less imports by 2035. From Germany's perspective, we expect the electronic sector (D26) and the automotive sector (D29) to be most affected in terms of trade volume.

The computer, electronic and optical products industry (D26)

Because Germany's import volume in the electronic industry clearly surmounts the export volume, following our hypotheses, we expect a rising import volume and an increasing share of Germany's RCEP imports relative to its overall world imports in this sector. A significant share of Germany's overall exports is D26 value-added from RCEP ($4.9 bn). In fact, $2.3 bn value-added comes from China alone, exceeding that of the USA as well as EU27. Over time, not only have D26 inputs become a more important part of Germany's exports (in relative as well as absolute terms), but RCEP's D26 foreign value-added content in Germany's exports, i.e. the RCEP share of this, has increased even more, rising from $0.8 bn or five percent in 1995 to $4.9 bn or ten percent in 2018. This illustrates Germany's dependence on RCEP D26 inputs, in particular from China, which is expected to increase as a result of the agreement. As discussed, of Germany's $4.9 bn value-added RCEP inputs from the D26 industry, $3.3 bn are contained in Germany's exports in other industries than D26, such as the D29 products for which they play a significant role. Moreover, this relation has been persistent for many years. Hence, Germany's intra-industry dependence on foreign inputs of the D26 industry is relatively low, while Germany relies more on D26 inputs from RCEP for exports in other industries, such as automotives of the D29 industry,

which emphasises the degree of vertical specialisation across industries, which we expect to persist and perhaps intensify in the future due to RCEP's impact.

The motor vehicles, trailers and semi-trailers industry (D29)

The local automotive sector in the RCEP region is going to benefit significantly as harmonised rules of origin and reduced trade barriers unlock additional market access with lower production costs and more efficient value chains, for instance, for local automotive giants such as Toyota, Hyundai, Nissan, Kia or Honda as well as some of their suppliers. Therefore, the trade creation effect will have a large impact on this industry. Correspondingly, Germany's D29 sector will be significantly impacted as it is Germany's largest export industry regarding trade with RCEP as well as world trade, accounting for 16 percent of its world exports. According to hypotheses H2 and H4, both exports to RCEP and non-RCEP countries are expected to decline. While today, more than 80 percent of Germany's $41.4 bn D29 RCEP exports go to either China, Japan or South Korea, companies from the RCEP zone are incentivised to shift imports from Germany to local manufacturers. Therefore, the German D29 sector faces declining exports as a large trade share is threatened by increased competition due to reduced trade barriers, harmonised rules of origin and high-quality alternatives among RCEP members. While Germany's D29 exports increase over time, its rising exports to RCEP are particularly driven by trade with China. Combined with the high trade volume, this suggests that working to sustain and further develop RCEP as an export market in this industry depends in large parts on exports to China and how Germany can sustain and influence this, such as by local investment.

Nevertheless, there are two trade-protecting aspects that lower the elasticity of substitution. On the one hand, it is the perception of German products regarding, for example, quality and prestige. On the other hand, German multinationals such as the large automotives BMW, Mercedes or Volkswagen, some of their suppliers and other companies in the industry are invested locally. BMW, for instance, sells every third car in China, which amounts to approximately 794.000 cars for 2022, Asia being its largest sales region with 38 percent of revenue (BMW, 2023). Also for Mercedes-Benz China is the largest single market with approximately 754.000 cars sold in 2022 resulting in 18 percent of revenue coming from China and 30 percent from Asia (Mercedes-Benz, 2023). Moreover, Volkswagen delivered approximately 3.182.000 passenger vehicles to China alone in 2022, while the Asia-Pacific

region accounts for approximately 18 percent of its global 2022 revenue (Volkswagen, 2023). Consequently, as Germany is heavily invested locally in this industry, it is going to participate in the benefits of the agreement, which is particularly relevant for its D29 imports that are going to benefit from increased cost advantages.

The wholesale and retail trade; repair of motor vehicles industry (D45T47)

In addition, the D29 industry is closely connected to the automotive service sector, which itself accounts for $21 bn in exports to RCEP. On the one hand, we therefore expect the same effects for this industry regarding export flows as for the D29 exports. On the other hand, as this industry also entails large import flows, following hypothesis H3, we expect more German imports due to rising market shares of RCEP in this regard. These effects combined will cause a declining trade surplus of Germany with RCEP in this industry, which today is disproportionately large compared with its overall D45T47 foreign trade (see Table 3.5). FDI and other forms of local investment in the D29 as well as D5T47 industries can protect exports flows.

The textiles, wearing apparel, leather and related products industry (D13T15)

There has been a history of companies in the textiles industry from the relatively more developed Japan, South Korea and also China to invest in relatively less developed countries by means of joint ventures and subsidiaries, which has contributed to the industry's regional supply chains (Gereffi, 1999; Lopez-Acevedo and Robertson, 2012). Multinationals place production orders and supply raw material to their subsidiaries in less developed, lower-wage countries that undertake the more labour-intensive tasks. Therefore, this industry is a good example of the conventional picture of offshoring and the model of offshoring from Chapter 2.

The industry's supply chains not only expand across countries and are in most parts regional to Asia-Pacific, but are also highly vertically specialised (Lu, 2019). Thus, single tasks are highly interchangeable and observe a high price elasticity of substitution (Dickerson, 1999). While this is a pattern generally observable between geographically close countries and particularly in the Asia-Pacific region due to its large differences of countries' development stages, it is particularly pronounced in this industry (Kojima, 2000). These aspects enhance the opportunity for involved companies to benefit from

RCEP, especially based on the harmonised rules of origin. Consequently, the industry's supply chain in the region becomes more efficient and gains additional global market share, leading Germany to increase its imports.

RCEP countries, together with a few non-member states such as India, Pakistan and Bangladesh, are still today considered the garment factory of the world, as was highlighted by the recent report of the International Labour Organization (ILO) on employment, wages and productivity trends in the Asian garment sector. It finds that Asia accounts for 55 percent of the world's textiles and apparel exports and employs 60 million workers (ILO, 2022). As RCEP accounts for most of this (approximately 50 percent of world exports), this makes the D13T15 industry critical for RCEP as well. The RCEP agreement itself reinforces Asia's dominance in this industry by enabling further enhanced supply chains and competitiveness, despite challenges the industry faces in terms of remaining poor working conditions, pressure towards more sustainability and countries failing to move toward higher value-added tasks (ILO, 2022).

3.6 Conclusion

RCEP member states have become a more important trading partner for Germany in recent decades, both in relative and absolute terms. This development is expected to continue, with RCEP being a multiplying factor. The economic effects caused by the agreement are complex and ambiguous. We show that, overall, Germany will increase its imports from RCEP, thereby becoming more dependent on RCEP members for key imports and is likely to face reduced exports. Moreover, Germany's already substantial trade deficit with RCEP will increase. There are two sides to this coin as, on the one hand, the increased imports can yield benefits such as reduced import prices leading to increased competitiveness while, on the other hand, Germany becomes more dependent on key inputs, among others, for producing many of its exports. Despite the opportunities stemming from cheaper imports and the RCEP region's economic upheaval, we see dominating trade diversion effects for Germany, which is in line with findings of e.g. Park et al. (2021).

Each industry is going to be affected somewhat differently. We find that Germany faces an increasing dependence on its largest import industry, the electronic sector, which is important to many German industries. Of all of Germany's imports in this industry, 50 percent come from RCEP members and 30 percent from China alone. Thus, Germany

should diversify its sourcing strategy to decrease vulnerability to supply shortages, as experienced in the wake of the COVID-19 pandemic. This could potentially be done by near-shoring or re-shoring some of its RCEP inputs to the EU, where its existing trade ties have increased over time in this industry, however, more so as an export market (OECD, 2023a). On the other hand, Germany should encourage local investment in RCEP states. This would, for example in the form of FDI, enable German companies or subsidiaries to benefit from positive local RCEP effects and secure inputs in this industry. This is particularly relevant regarding China, which is where 30 percent of Germany's world imports in this industry (or 60 percent of its RCEP imports in this industry) come from.

Moreover, these aspects also concern the automotive sector, Germany's largest export industry. Inputs from RCEP in its electronic sector play a disproportionately large role among RCEP imports for Germany's automotive industry and originate from China to approximately 50 percent. Especially for the automotive sector, increased local investment will benefit German companies. It is critical for Germany in this industry, as we expect large local benefits from the RCEP agreement causing a transformation of this sector's GVCs. Harmonised rules of origin and reduced trade barriers unlock additional market access with lower production costs and more efficient value chains, for instance, for local automotive giants such as Toyota, Hyundai, Nissan, Kia or Honda as well as their local suppliers leading to further regionalised supply chains and higher trade volumes. The finding by Estrades et al. (2022) that the majority of trade expansion occurs in the form of intra-RCEP trade together with this analysis' hypotheses from Section 3.5.1 support this recommendation. Encouraging local investment in the automotive will not only enable benefiting from increased cost advantages and more efficient local supply chains but also protect Germany's key exports to the region. This also applies to the closely connected service sector wholesale and retail trade; repair of motor vehicles.

For the textiles industry, we expect a rising import volume and an increasing share of Germany's RCEP imports relative to its overall world imports in this sector, while pressure for more sustainability and local supply chains work against this. This latter effect, however, applies mainly to higher-value products, which constitute a small part of the traded goods in this industry.

Economically and politically, the relationship with China is the largest factor in mitigating negative consequences and benefiting from positive local effects. Therefore, Germany should make reinforcing existing ties with China as well as creating new ones a top

priority of its foreign politics. Germany's focussed approach in this regard began with its Indo-Pacific principles, published in September 2020, aiming at strengthening Germany's role in this region in the long run by intensifying international cooperation, supporting local partners and preserving a rule-based maritime order (German Federal Foreign Office, 2020). Some first specific measures were taken so far, including Germany's accession to the regional anti-piracy regime ReCAAP, intensified bilateral relations with Australia and Japan as well as a newly created centre for fact-based communication on Germany and its foreign politics and regional dialogue within its Federal Foreign Office in Singapore, among others (German Federal Foreign Office, 2020). Moreover, Germany has expanded its partnership with ASEAN for development purposes. Between 2018 and 2022 it invests a total of 131 million Euro in local projects, making Germany the largest supporter in this regard among EU members. Two aspects show the importance of Germany's local political engagement. Firstly, military spending in the Indo-Pacific increased by 50 percent between 2010 and 2019, in the case of China by 80 percent, pointing towards increasing political tension (German Federal Ministry of Defence, 2022). On a side note, this underscores how remarkable the far-reaching RCEP agreement is, making trade liberalisation a common ground between the members in the region despite political tensions and counteracting the trend of protectionism seen in many regions across the world (Matthes and Kolev, 2020). Secondly, 90 percent of world trade is facilitated via sea routes, a large share of which through the Indo-Pacific region. In fact, nine out of ten of the world's largest container ports are located in the Indo-Pacific, six alone in China (German Federal Ministry of Defence, 2022). A deterioration of political tensions in the Indo-Pacific could have significant, also economic, consequences. Another key aspect is the mentioned development of the world's economic centre of gravity moving toward Asia, which is amplified by RCEP. In terms of global GDP, the share of RCEP and India taken together will rise from 32.3 percent in 2021 to 35.1 percent in 2035 while at the same time the shares of highly developed nations such as the USA, UK, Germany, France, Canada, Italy, and Spain among others, as NATO+ developed countries, decrease from 57.9 percent to 51.8 percent (Petri and Plummer, 2023). Furthermore, Asian economies are more dynamic and the reliable estimates of future population changes forecast increasing Asian workforces. Consequently, despite Germany's important and far-reaching political and economic engagement in Asia, a more China-centric political agenda is necessary and local investment into RCEP member states ought to be supported while at the same time managing increasing dependence on key inputs. This will preserve existing exports and market shares and at the same time

enable to benefit from positive local RCEP effects through investment, thereby further developing RCEP as a market for exports.

4 Financial market and risk analysis of the RCEP zone

4.1 Introduction

The development of financial markets and economic growth are interrelated, a linkage dating back to the conceptualisation that skill and knowledge need borrowed capital for they can be put to effective use by their economic agents (Bagehot, 1873). Hence, well-developed financial markets play a key role for rising economic growth, capital accumulation and technological innovation, a concept emphasised already by Schumpeter more than a century ago (Alfaro et al., 2004). The basic argumentation of financial market development causing economic growth argues that well-developed financial markets lower the costs of transactions, thereby enabling an efficient allocation of funds, while competition of economic agents causes efficient specialisation of activities resulting in economic growth (Greenwood and Smith, 1997).

Because of RCEP's significant (economic) implications as well as its distribution of effects with a concentration of additional international trade occurring primarily within the RCEP economies, an analysis of the financial markets in the RCEP region is of great interest. As discussed in Chapter 3, an incremental increase of $465 bn in exports is estimated by 2030 from RCEP members to other RCEP members as well as $49 bn to other countries due to RCEP provisions (Park et al., 2021). In line with theory on FTAs, Chapter 3 outlined a significant decrease in trade outside RCEP and the additional trade for the region is accompanied by increases in income as well as overall positive labour market implications. Several findings from literature support a strong positive correlation of financial market development, for instance in the form of the stock or bond market, and economic growth, some of which show this to be a causal relationship. Our subsequent analysis focusses on the stock market.

Although the incrementally added economic growth of RCEP is not preceded and caused by financial market growth but a consequence of the provisions of the agreement, the aspects mentioned together with the significance of RCEP's effect call for a detailed financial market analysis of the RCEP region.

4.1.1 Literature review

In accordance with the conceptualisation by Bagehot (1873) as well as Schumpeter (1912), Shaw (1973) and McKinnon (1973) emphasise a positive connection between financial

sector expansion and progression of the real economy. Together with Goldsmith (1969) they are among the early protagonists of this view on financial markets and economic growth, analysed extensively over the years. Because their research was based on traditional growth theory of the time, however, it lacked the analytical foundations emerged later that prove financial market development to stimulate the level of economic development and to potentially induce growth effects (Pagano, 1993). Previously, financial intermediation was found to be correlated with the level of capital stock per labour unit or the productivity level, not however to the growth rate. Endogenous growth models led to advances from this perspective and to increased interest in the financial market and economic growth nexus (Pagano, 1993). These models allow an explicit modelling of financial intermediaries' services such as liquidity provision, information collection and analysis as well as risk sharing (Kahn and Senhadji, 2003). The rationale behind the causality can be explained by two factors. Firstly, in a solid financial market, the costs of transactions are such that funds are allocated efficiently to their most advantageous use. Secondly, consumption is stabilised as investors can diversify investments effectively, enhancing economic growth (Colombage, 2009). Greenwood and Smith (1997) show this twofold argumentation of causality by means of two models of intermediated activity. To show the role of bank and stock markets in allocating funds to those activities in the economic system yielding the highest returns they use the Diamond and Dybvig (1983) liquidity provision model (Greenwood and Smith, 1997). This is also the focus of Shaw (1973) and McKinnon (1973). Using the model of intermediated transactions by Townsend (1978), their analysis proves that competition of economic agents causes efficient specialisation of activities.

As pointed out by Kahn and Senhadji (2003), literature on this topic is quite extensive and entails other studies, such as Greenwood and Jovanovic (1990), Bencivenga and Smith (1991), Roubini and Sala-i-Martin (1992), Obstfeld (1994) and Bencivenga et al. (1995). On the basis of these theoretical foundations from the literature numerous studies set out to empirically analyse the nexus of financial market and economic growth, its development as well as causality, each with a different focus, for instance, regarding the financial market segment of bank, bond or stock market. A selection of the extensive research is discussed in the following.

King and Levine (1993) find that the banking sector is strongly positively associated with economic growth as well as the growth rate of technology and physical capital (by means of both cross-section and panel analysis for 80 countries of different development levels).

Kahn and Senhadji (2000) find a strong positive and significant relationship between financial development and economic growth for the banking, bond as well as stock market, in their analysis of 159 countries of different development levels. The result is confirmed for the stock market by several studies, including Levine and Zervos (1998) and Beck and Levine (2001, 2002) with a focus on large country samples, by Bassani et al. (2001) and Leahy et al. (2001) with a focus on highly developed economies as well as by Platek (2022) focussing on less developed economies (Fink et al., 2005). Other studies find ambiguous results including Fink and Haiss (1999), Hahn (2002) and Fink et al. (2004). Fink et al. (2005) find strong evidence for short-run growth effects for emerging economies, while the effect is weak for industrialised countries. Regarding investment, Alfaro et al. (2004) find that while FDI itself has ambiguous effects on economic growth, economies with highly developed financial markets observe significant benefits from FDI. In their empirical analysis of the connections between financial markets, FDI and economic growth they use cross-country data from 1975 to 1995 for numerous members and non-members of the OECD. Financial integration of several markets in a region can lead to enhanced access to capital, thereby contributing to the discussed effect of financial markets on economic growth. Guiso et al. (2004) find that financial integration in the EU does not lead to financial development in the local markets but improves firms' access to the international financial markets of the region. This is supportive of the development of both more and less economically developed countries in a region experiencing financial integration. Colombage (2009) supports the discussed hypothesis on causality, finding that the development of financial markets stimulates economic growth. In his analysis of the five highly developed economies Canada, Japan, Switzerland, the UK and the USA from 1995 to 2006, Colombage finds uni-directional causality from financial market development to economic growth (except for Canada, for which the opposite causality is found), using Granger causality testing based on vector error-correction models. Moreover, his analysis incorporates the three major financial segments of bond markets, stock markets and credit markets, which are interrelated. Using a different method, Cave et al. (2020) find a robust negative relation of the banking sector and economic growth, while the relationship of stock market development and growth is positive (up to a threshold). Analysing 101 countries from 1990 to 2014 their analysis makes use of a multiple-indicators-multiple-causes model that treats the two indicators of financial development, namely banking sector and stock market, as two latent indicators (Cave et al., 2020).

Also concerning the stock market in particular its positive relationship with economic

growth is an empirical fact (Capasso, 2008). Several studies examined this relation for specific countries. The following provides an overview of the results found for different countries using different analysis methods. Wong and Zhou (2011) find that the stock market development and economic growth exhibit a strong positive correlation. Using cross-country panel data for China, USA, UK, Japan and Hong Kong, their empirical analysis shows independently strong positive correlations of stock market development and economic growth (Wong and Zhou, 2011). Despite unproven causality, this result supports the theory that financial market development is a driver for economic growth for different types of financial and economic systems. Guru and Yadav (2019) are among those filling the gap of analysing this relationship on emerging economies in particular. For Brazil, Russia, India, China and South Africa, they find that both banking sector and stock market indicators stimulate economic growth, while the different indicators of financial market development are complimentary. Banking sector indicators of their analysis include financial intermediaries' size, domestic credit to private sector (CPS) as well as credit to deposit ratio (CDR), while the value of shares traded and the turnover ratio comprise the stock market development indicators (Guru and Yadav, 2019). Furthermore, Ngare et al. (2014) find a positive effect of stock market development on economic growth analysing 36 African countries from 1980 to 2010. While economies with stock markets generally grow faster, relatively less developed economies with a stock market are found to grow faster than relatively more developed economies (Ngare et al., 2014). Enisan and Olufisayo (2009) add to this, analysing seven economies in sub-Saharan Africa. Using vector error-correction models in Granger causality testing, analogous to Colombage (2009), they find a causal relationship of stock market development on economic growth for Egypt and South Africa. Bi-directional causes are found for Kenya, Ivory Coast and Zimbabwe (Enisan and Olufisayo, 2009). Using a similar approach with a vector error-correction model and Granger causality testing, Vazakidis and Adamopoulos (2009) find opposite causality in their analysis of the French economy from 1965 to 2007. Lazarov et al. (2016) find robust positive relationship in this context for Macedonia using both panel regression models (fixed and random effects) as well as the dynamic panel model of Generalised Method of Moments analysing the period of 2002 to 2012. Nyasha and Odhiambo (2017) confirm this for the Kenyan economy in their analysis of stock market and banking sector development and economic growth from 1980 to 2012, applying the autoregressive distributed lag bounds testing approach. They find a positive effect of the former on growth, whereas banking sector development is found to have a negative influence. Their

results are robust both in the short and long run (Nyasha and Odhiambo, 2017). Azam et al. (2016) analyse Bangladesh, India, China and Singapore and find significant positive short-run relation of stock market development and growth for India and China as well as significant long-run effects for China and Singapore. Pan and Mishra (2018) find no evidence of a close relationship between stock market development and short-run economic growth for China. Borteye and Peprah (2022) find supporting evidence for Ghana using bivariate and regression analysis for the years 2014 to 2018. The stock market dimension of market liquidity and economic growth exhibit a strong positive relationship, while market capitalisation shows a moderately positive and market size a moderately negative correlation (Borteye and Peprah, 2022).

4.2 Theoretical implementation

We analyse the heterogeneous market situations of the RCEP members and investigate whether concluding the RCEP agreement had a significant impact on the markets of the respective member states. For this purpose, we first look at the time series of price and returns, followed by the respective volatilities. Volatility analysis has been used for decades in such contexts and provides a suitable tool for this chapter's research interest.

ARCH (Autoregressive Conditional Heteroskedasticity) and GARCH (Generalized Autoregressive Conditional Heteroskedasticity) models are statistical techniques employed to analyse and predict volatility in financial time series data. These models address the issue of varying levels of volatility observed in financial markets over time. In ARCH, past squared deviations from the mean are regressed against the present volatility, acknowledging the influence of historical data on the current volatility. GARCH further refines this approach by incorporating a wider range of lagged squared returns, offering a more comprehensive understanding of volatility patterns. These models play a crucial role in assessing and managing risk, as well as in pricing financial derivatives. They are used to analyse effects unexplained by econometric models, residually leaving the error term unexplained. With ϵ_t denoting the error terms and $\alpha_0 > 0, \alpha_i \geq 0, i > 0$, a time series σ_t^2 using ARCH is modelled by:

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i \epsilon_{t-i}^2$$

If a model, for the realisations of a stochastic process, imposes an assumption on the

conditional variance of the process, it is considered a GARCH(p,q) model (where p is the order of σ^2 and q is the order of ϵ^2) and described as a generalisation of ARCH models. It is given by:

$$y_t = x_t' b + \epsilon_t$$

$$\epsilon_t | \psi_{t-1} \sim N(0, \sigma_t^2)$$

$$\sigma_t^2 = \omega + \sum_{i=1}^{q} \alpha_i \epsilon_{t-i}^2 + \sum_{i=1}^{p} \beta_i \sigma_{t-i}^2$$

ARCH and GARCH models and their extensions are highly popular due to their performance in estimating volatility in risk measurement (see e.g. Poon and Granger, 2005). The field of GARCH model extensions is vast, with one promising avenue being the exploration of semi-parametric extensions (Feng, 2004). These extensions combine parametric and non-parametric techniques, offering a flexible framework to better capture the complex dynamics present in financial time series data. By integrating established GARCH elements with non-parametric methods like kernel estimation or splines, researchers can gain insights into volatility patterns and tail behaviour. However, the challenges of model complexity and over-fitting necessitate careful consideration in model selection and validation.

Let us briefly take a closer look at some of the most common extensions of ARCH and GARCH models besides GARCH models, namely APARCH, EGARCH, CGARCH as well as GJR-GARCH. The Asymmetric Power ARCH (APARCH) model is an extension of the ARCH and GARCH models used in time series analysis. One of its primary features is its ability to account for both asymmetry and leverage effects in volatility. The model recognises that financial markets often exhibit asymmetric responses to positive and negative shocks, meaning that volatility reacts differently to upward and downward movements. Additionally, the leverage effect is captured, indicating that volatility tends to increase more substantially in response to negative shocks compared to positive shocks and, in contrast to asymmetry, is determined by past information (Feng and Sun, 2013). By incorporating these features, depending on the context, the APARCH model can provide a more accurate representation of the complex dynamics of financial markets, making it a valuable tool for risk assessment, derivative pricing, and portfolio management. To capture the asymmetric effect, the model introduces an additional parameter providing more flexibility in modelling financial data with varying levels of volatility in different

market conditions. The APARCH model is defined by

$$r_t = \sigma_t \varepsilon_t, \qquad r_t | \mathcal{F}_{t-1} \sim N(0, \sigma_t^2), \tag{19}$$

with

$$\sigma_t^\delta = \omega + \sum_{i=1}^{p} \alpha_i (|r_{t-i}| - \gamma_i r_{t-i})^\delta + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^\delta, \tag{20}$$

where $\omega > 0; \delta \geq 0; \alpha_i \geq 0, i = 1, \ldots, p; -1 \leq \gamma_i \leq 1, i = 1, \ldots, p; \beta_j \geq 0, j = 1, \ldots, q$.

The Exponential GARCH (EGARCH) model is another extension of the GARCH model used in time series analysis. It also accounts for both asymmetry and leverage effects in volatility modelling, allows for capturing the impact of positive and negative shocks on volatility differently, as well as accounting for the influence of past shocks on current volatility levels. The EGARCH model is defined by

$$r_t = \sigma_t \varepsilon_t, \qquad r_t | \mathcal{F}_{t-1} \sim N(0, \sigma_t^2), \tag{21}$$

with

$$log_e(\sigma_t^2) = \omega + \sum_{i=1}^{p} (\alpha_i z_{t-i} + \gamma(|z_{t-i}| - E|z_{t-i}|)) + \sum_{j=1}^{q} \beta_j log_e(\sigma_{t-j}^2), \tag{22}$$

where $z_{t-i} = \frac{\varepsilon_{t-i}}{\sigma_{t-i}}$. The sign effect of shocks on volatility is given by α_i, which reflects the leverage effect and is typically negative (see Nelson, 1991).

The Component GARCH (CGARCH) model as another extension introduces the concept of multiple volatility components, allowing for a more nuanced understanding of volatility dynamics. CGARCH can capture distinct sources of volatility, such as short-term and long-term effects, enhancing the model's ability to describe complex volatility patterns and providing valuable insights for risk management and forecasting in financial markets. The CGARCH model is defined by

$$r_t = \sigma_t \varepsilon_t, \qquad r_t | \mathcal{F}_{t-1} \sim N(0, \sigma_t^2), \tag{23}$$

with

$$\sigma_t^2 = q_t + \sum_{i=1}^{p} \alpha_i (r_{t-i}^2 - q_{t-i}) + \sum_{j=1}^{q} \beta_j (\sigma_{t-j}^2 - q_{t-j}), \tag{24}$$

where

$$q_t = \omega + \rho q_{t-1} + \phi(r_{t-1}^2 - \sigma_{t-1}^2). \tag{25}$$

Furthermore, the GJR-GARCH model (where GJR stands for the initials of the economists who introduced the model, namely Glosten, Jagannathan, and Runkle) accounts for asymmetric volatility, where the impact of positive and negative shocks on volatility differs. Moreover, this model introduces an additional parameter that captures the asymmetry, allowing for more accurate modelling of financial data with varying responses to different shocks. The GJR-GARCH model is particularly useful for capturing abrupt changes in volatility triggered by extreme events. The GJR-GARCH model is defined by

$$r_t = \sigma_t \varepsilon_t, \qquad r_t | \mathcal{F}_{t-1} \sim N(0, \sigma_t^2), \tag{26}$$

with

$$\sigma_t^2 = \omega + \sum_{i=1}^{p} (\alpha_i r_{t-i}^2 + \gamma_i I_{t-i} r_{t-i}^2) + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2, \tag{27}$$

where γ_i is the leverage-term (Glosten et al., 1993). A more detailed explanation of these models will be omitted due to the scope of this chapter and the interested reader is referred to renowned literature like "An Introduction to Univariate GARCH Models" (Teräsvirta, 2009) or "Analysis of Financial Time Series" (Tsay, 2010).

The object of investigation of this analysis, as derived in the subsequent section, are a number of time series on country indices as well as company stocks together with the MSCI World index and several Exchange-Traded Funds (ETFs) for reference purposes. Generally, for every time series there is a specific GARCH model with its specific order that fits best for the respective time series.

Table 4.1 illustrates the model specifications of the extensions of ARCH and GARCH models together with the chosen GARCH(1,1) model for the time series of the MSCI World index used in this chapter for the time series from January 1$^{\text{st}}$, 2018 to June 30$^{\text{th}}$, 2023. The significance levels are given by $* = 0,05$, $** = 0,01$ and $*** = 0,001$[10]. In addition, the bottom row depicts the measurement values of the Bayesian Information Criterion (BIC). BIC is used as a measure of model fit and complexity, and its goal is to balance these two factors. Therefore, when comparing BIC values, a lower (more negative) BIC value indicates a better-fitting model that is also less complex. We see

that the differences are marginal and that the simple GARCH(1,1) model performs well in comparison, although the GJR-GARCH model observes the lowest and thus best BIC value. Moreover, EGARCH models, for example, sometimes prove not to be as suitable as a GARCH(1,1) model, which is also the case in this analysis, as Table 4.1 shows by means of less significant standard deviations.

Table 4.1: Coefficients from different GARCH models - MSCI World time series

Coefficients	GARCH(1,1)	APARCH(1,1)	EGARCH(1,1)	CGARCH(1,1)	GJR-GARCH(1,1)
μ	1.975335e-04	7.146113e-05	-2.562657e-05	2.118073e-04	-3.880657e-06
SD	2.703153e-04***	2.748067e-04***	0.0002743534***	2.703896e-04***	2.721879e-04***
ω	7.660894e-06	7.854418e-08	-9.520942e-01	6.270199e-08	1.098440e-05
SD	6.315498e-07***	5.882265e-07***	0.2541219580	2.066718e-07***	3.356957e-07***
α_1	1.196866e-01	7.718987e-02	-9.494102e-02	1.354138e-01	8.261367e-02
SD	1.222261e-02*	2.048450e-02*	0.0256418265*	2.456941e-02*	1.260986e-02*
β_1	8.254659e-01	8.173770e-01	8.934384e-01	7.819402e-01	7.802359e-01
SD	1.509137e-02*	6.618938e-02	0.0280300226*	4.771101e-02*	1.624072e-02*
γ_1		9.871257e-02	2.801331e-01		1.103199e-01
SD		5.685787e-02	0.0357906698*		3.310576e-02*
δ_1		1			
SD					
ρ				9.997288e-01	
SD				1.663330e-04***	
ϕ				1.057866e-02	
SD				4.061926e-04***	
BIC	-6.227747	-6.218488	-6.229941	-6.216729	-6.230760

Source: Author's calculation

For the purpose of comparability and simplicity in the application, given the research question at hand, this analysis focusses on a simple GARCH(1,1) model, which has proven to be the most variable model in many studies. Moreover, the applied models assume a normal distribution of the data. The boxplot figures of Section 4.3, for instance, can be used to see that this fits best to the respective data. Furthermore, for the application in R, the Quantmod package is used regarding the data, the rugarch package for the modelling tasks and the PerformanceAnalytics package for diagrams such as, for instance, Figures 4.5 and 4.12 in the following.

[10]The APARCH, EGARCH and GJR-GARCH models have the additional parameter γ, the APARCH model the additional parameter δ and the CGARCH model the additional parameters ρ and ϕ. Moreover, some coefficients are not statistically significant, as illustrated by the significance levels of the standard deviations. Thus, some of the results ought to be interpreted with caution. This equally applies to the coefficients of the GARCH models applied in the following and depicted in Appendix C.

4.3 Empirical analysis

4.3.1 Specifications

The largest companies of an economy (that are listed on the stock market) oftentimes constitute the majority of a country's GDP and output, making them a suitable approximation for our analysis in this context and allowing for good interpretability of results. For this reason, the financial market analysis focusses on those RCEP members with the highest economic influence. In order to make the appropriate selection of economies, Table 4.2 illustrates the RCEP members with key indicators of economic development and trade. We see the dominance of China reflected by GDP and the fact that it constitutes 60 percent of RCEP's economic power (in terms of GDP), while China, Japan and South Korea jointly make up more than 80 percent of RCEP in this regard. The cumulated RCEP share of GDP shows that the top six countries account for approximately 94 percent of the RCEP GDP. Therefore, the following financial market analysis focusses on these six, namely China, Japan, South Korea, Australia, Indonesia and Thailand.

Table 4.2: RCEP members' indicators of economic development and trade (in $ bn)

RCEP Member	GDP, 2011	10-year GDP growth	GDP, 2021	Ranked cumulated RCEP share	GDP per capita, 2021	Exports of goods and services, 2021	Imports of goods and services, 2021
CHN	7551.5	135%	17734.1	59.84%	12556.3	3553.5	3091.3
JPN	6233.1	-21%	4940.9	76.51%	39312.7	910.5	936.4
KOR	1253.2	45%	1811.0	82.62%	34997.8	761.2	694.4
AUS	1398.4	11%	1552.7	87.86%	60443.1	342.8	276.3
IDN	893.0	33%	1186.1	91.86%	4332.7	255.7	223.7
THA	370.8	36%	505.9	93.57%	7066.2	294.5	295.7
SIN	279.4	42%	397.0	94.91%	72794.0	733.8	609.3
PHI	234.2	68%	394.1	96.24%	3460.5	101.4	148.8
MAL	298.0	25%	373.0	97.50%	11109.3	256.8	230.2
VIE	172.6	112%	366.1	98.74%	3756.5	341.6	341.2
NZL	168.3	48%	249.9	99.58%	48781.0	56.3	66.4
MMR	54.1	20%	65.1	99.80%	1209.9	18.4	16.2
KHM	12.8	110%	27.0	99.89%	1625.2	17.4	18.2
LAO	8.8	115%	18.8	99.95%	2535.6	0.0	0.0
BRU	18.5	-24%	14.0	100.00%	31449.1	11.2	9.4

Source: Author's illustration based on World Bank (2023)

In the following, we also analyse the most important sectors of the RCEP member countries, in order to find more specific implications of the financial market development. We focus on the three most relevant industries, determine by the global trade volume of RCEP

members in terms of TiVA combined with the analysis of the most impacted sectors by RCEP provisions, as outlined in the previous chapter. Consequently, the three industries of interest for our financial market analysis of RCEP effects are the electronic, the automotive as well as the chemical sector. Therefore, the following analysis is going to examine these in detail regarding their development, stock returns as well as volatility and associated risk. This is done based on the five most important companies of each of these sectors in terms of revenue. Prior to this analysis we examine the six largest economies of the RCEP zone in the same context by means of their respective financial market indices.

Moreover, our subsequent analysis focusses on the stock market. All stock market data is retrieved from Yahoo Finance (2023), based on which, for instance, returns, cumulative returns and volatilities are calculated. All figures and tables of the remainder of this chapter use this data source and therefore, their source can be noted as the author's calculation (and illustration) based on Yahoo Finance (2023). For simplicity, this source will thus not be given in each case. The main time span for our analysis reaches approximately five years back from the present and spans from January 1st, 2018 until June 30th, 2023. This provides information on the recent past in which RCEP has been effective, the months before when RCEP's entry into force was expected, as well as a small number of years before the agreement as a reference.

4.3.2 The development of the major RCEP indices

Before we turn to volatility and market risk, let us look at the price time series of the major indices as the basis for the subsequent analysis. Table 4.3 illustrates the indices for our selection of RCEP's member states together with the MSCI World Index. The latter is a commonly used reference index as it contains approximately 1,500 constituents from 23 highly developed economies. It entails a focus on the USA market as close to 70 percent of the investments are in companies from the USA and, for instance, slightly more than 10 percent are covered by Apple, Microsoft and Amazon taken together (MSCI, 2023).

See Table C1 in Appendix C for the coefficients of the GARCH model for these indices together with their significance levels.

Table 4.3: RCEP's major financial indices

Index	Country	Short Symbol	Constituents	ISIN
SSE	CHN	000001.SS	50	GB0007908733
Nikkei	JPN	N225	225	JP9010C00002
KOSPI Composite Index	KOR	KS11	928	KRD020020008
S&P/ASX 200	AUS	AXJO	n/a	AU000000ASX7
IDX COMPOSITE	IDN	JKSE	n/a	QT0009982189
SET	THA	SET.BK	50	XC0009694164
iShares MSCI World Index	n/a	URTH	1600	US4642863926

Figure 4.1: The price and returns time series of RCEP's largest financial markets

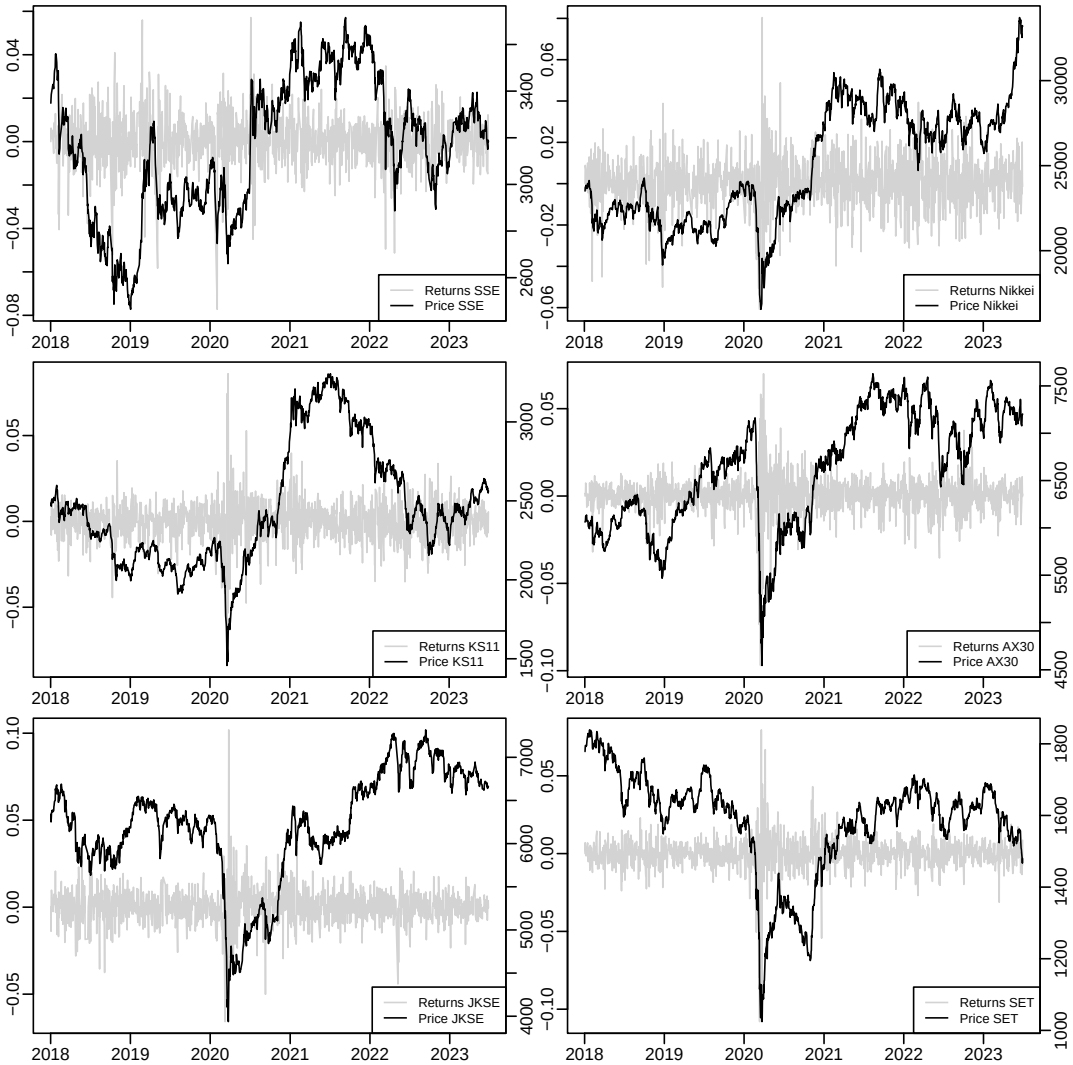
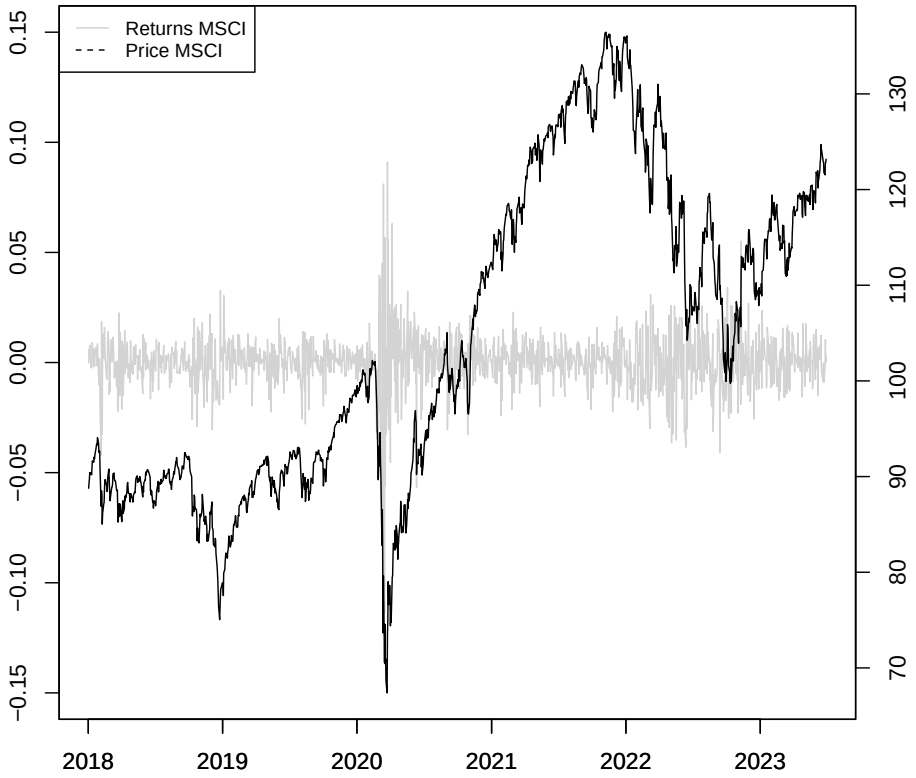


Figure 4.1 depicts the price and returns series from 2018 to June 30$^{\text{th}}$, 2023. The left axis depicts the returns while the right axis indicates the stock price in local currency. The price graphs of the six indices each show a consistently positive development in the long term, despite differences in their level and development. The impact of the COVID-19 crisis from early 2020 onward can be clearly seen. While this crisis resulted in heavy losses on the market, the price developments have since recovered. The Chinese Shanghai Composite index (SSE) stands out in this respect, since the price reaction as well as the subsequent rise in stock prices seen so clearly for most of the indices is much less significant for the SSE. The last 1.5 years represent the time of the RCEP agreement being effective, for which we see different developments, however, many factors play a role in this context. Concerning volatility of returns, the six indices show differences in their overall level of volatility as well as their changes over time. The Chinese stock market, for instance, depicts an overall larger volatility than the Indonesian IDX Composite or the SET from Thailand. We turn to a specific volatility analysis at a later stage.

Figure 4.2: The price and returns time series of the reference index MSCI World



For comparison, Figure 4.2 depicts the corresponding time series for the MSCI World. To illustrate and enable a better comparison of the different developments of the country indices, Figure 4.3 shows the six indices in a summary figure. A direct comparison shows that especially the Chinese financial market, represented by the SSE, has performed less well than the rest of the indices. A possible reason for this is the impact of trade restrictions in the context of the US-China trade war.

Figure 4.3: The price time series of RCEP's largest financial markets - summary

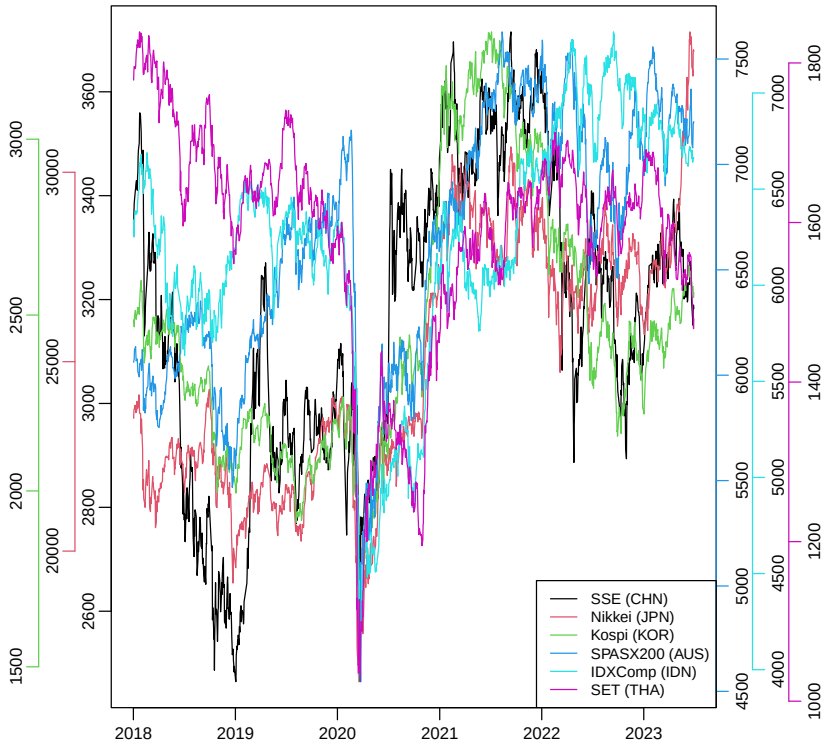
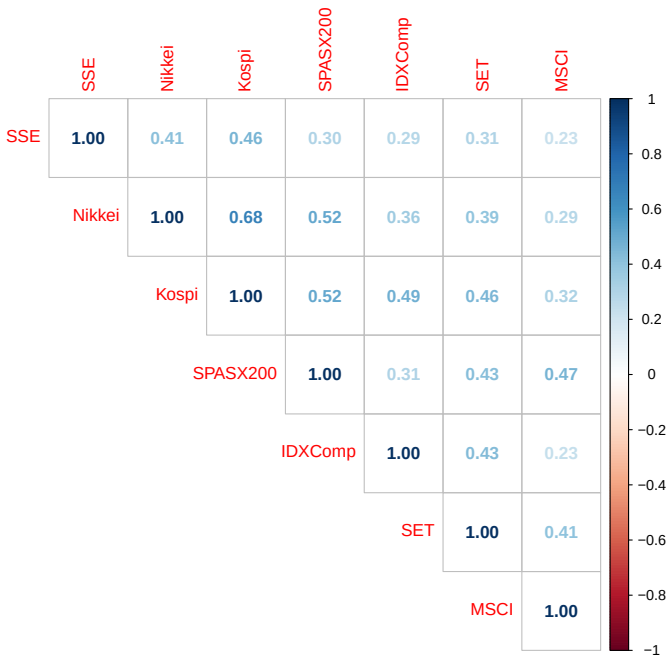


Figure 4.4 depicts the correlation measures between the different indices for the same time span as Figures 4.1 and 4.3, indicating a general correlation over a longer period. We see that there is a low correlation between each of the RCEP indices with the MSCI World index. This is, of course, influenced by the large share of companies from the USA the index is composed of. Nevertheless, the indices correlate with each other on a relatively low level given the fact that these economies are trading with each other to a significant extent. The highest correlations can be observed by the Japanese Nikkei with both the South Korean (Kospi composite) and the Australian (S&P/ASX 200) indices as well as between the latter two, with correlations between 0.5 and 0.6 for each of these three

combinations. Future additional trade facilitated by the RCEP provisions might lead to rising correlations.

Figure 4.4: Index correlation matrix of RCEP's largest financial markets

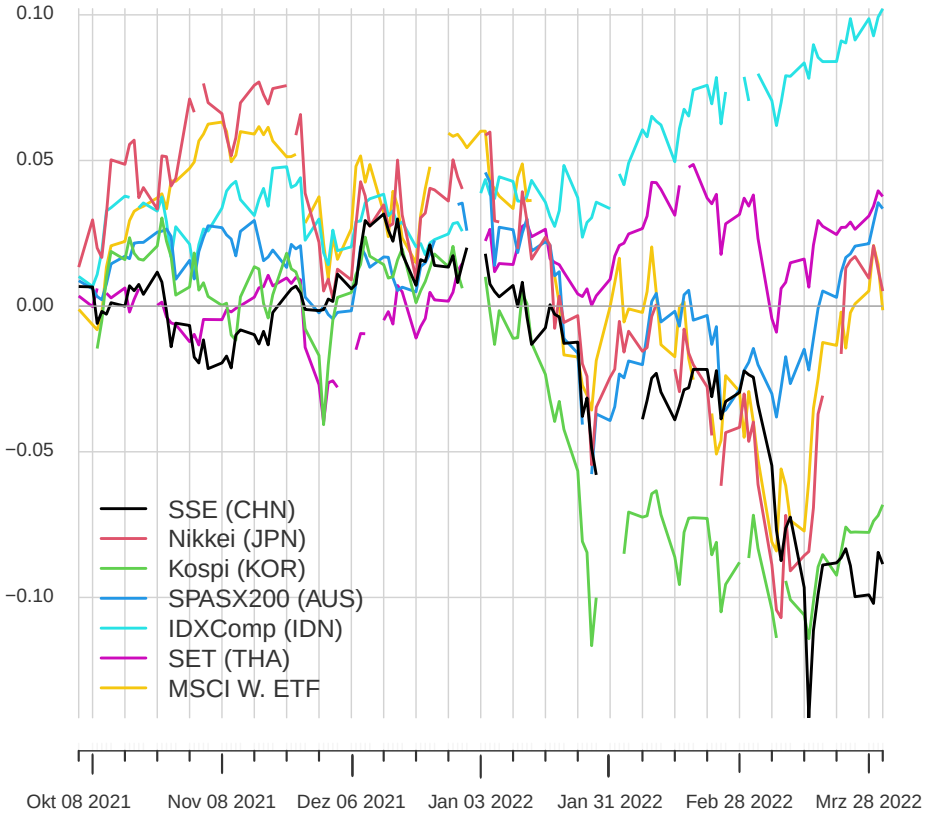


The previous illustrations form a basic understanding of the six main RCEP indices for our analysis. In the following, for most parts of the analysis, the time scale is adapted to a smaller time span of the more recent stock market development in the wake of the RCEP agreement's entry into force. We now turn to examine whether the formation of the RCEP free trade zone has had a positive effect on the financial markets under consideration as well as which markets might gain or lose. At this point, it needs to be acknowledged that there are, of course, many different influences on a country's financial market affecting index levels and changes. In this study we focus solely on the effect of the RCEP agreement and do not explicitly incorporate other influences into our analysis. Hence, the ability for causal interpretations is limited.

Besides a general positive effect on the stock market, among others in the form of returns, we expect a short-term effect on the stock markets of those RCEP members for which the agreement enters into force, specifically once the date of entry into force is certain as well as for a limited time span shortly after the entry into force itself. The minimum requirement for RCEP to enter into force 60 days later for the respective countries was a minimum

of six ASEAN as well as three non-ASEAN states domestically ratifying the agreement, which was met on November 2nd, 2021 (RCEP, 2022b). Moreover, as mentioned above, The RCEP contract was signed in November 2020 and entered into force for the first 10 of the 15 countries on January 1st, 2022, including China, Japan, Australia and Thailand, while South Korea followed one month later and Indonesia on January 2nd, 2023. Hence, we expect to be able to see a potential effect on the indices at the time of RCEP's entry into force for all of the six nations but Indonesia, for which its JKSE index could exhibit an effect in early 2023.

Figure 4.5: Short-term stock market performance of the major indices - cumulative returns (10/2021 - 03/2022)



Let us take a look at the short-term price changes for these periods. Figures 4.5 and 4.6 show us the cumulative returns of the six indices for the six-month time span of October 2021 to March 2022 and the corresponding boxplots, respectively. This allows us to see a potential effect from both the time of knowing the future date of entry into force as well as the entry into force itself. All graphs in Figure 4.5 interrupt at certain dates, determined by days on which the respective stock markets are closed, such as public holidays.

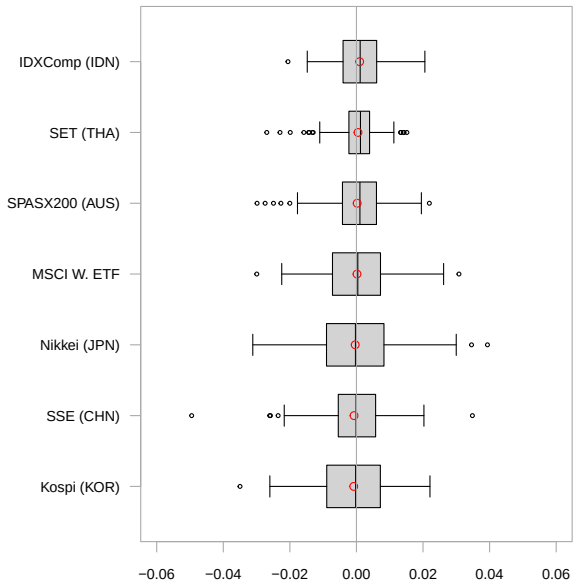
Observing the development of the graphs at the beginning of November, when the entry into force was known, we see a mixed development of the indices. In the first week of November, while the Australian and Indonesian indices mainly rise, others like the Chinese and South Korean fall slightly. The first few weeks of November are overall characterised by slightly rising cumulative returns of the indices. The expected entry into force of RCEP can be a contributing factor. Since China and Japan as well as Japan and South Korea had been lacking bilateral FTAs entirely we expect large increases of international trade volume for them. This expectation might contribute to the slightly rising cumulative returns of several RCEP indices in the first few weeks of November, however, does not seem to have a large effect if any.

Regarding the second time of interest, the entry into force beginning of January 2022, we again observe a relatively similar development of the indices although with different magnitudes of cumulative returns. Afterwards, however, it can be clearly seen that all major country indices fall along with the reference index. In particular, the large countries show a sustained and stronger negative change than the smaller countries. Even though it is theoretically possible that there is a positive effect of RCEP's entry into force at this point, which is overcompensated by negative effects with a larger magnitude in total, we reject our hypothesis of a short-term effect on the stock markets for the country indices of those RCEP members for which the agreement enters into force, shortly after entry into force. A supporting factor is the similar development of the Nikkei and the MSCI World index, since we expect a large positive impact for the Japanese economy. The Nikkei does not develop much differently from the reference index in terms of the stock market's cumulative returns over the observed period. Moreover, the country indices grow apart in following weeks until the end of the first quarter of 2022. While the stock markets of Australia and Thailand develop positively, the cumulative returns of others like the SSE and the Nikkei are mostly negative.

Figure C4 in the Appendix depicts the cumulative returns of the six country indices against the reference index over the same period and illustrates the described similarities as well as increasing variability towards the end of the period.

Figure 4.6 shows the corresponding boxplot for the same period, from which we can see changes in the cumulative returns from a different perspective. It shows us the distribution as well as the range of returns at a glance.

Figure 4.6: Short-term stock market performance (returns) of the major indices - boxplot (10/2021 - 03/2022)



The dot inside a box depicts the median of returns, i.e. the middle or 50 percent data point, while the solid line inside a box equals the mean. The box itself stands for the inter-quartile range (IQR) including the middle 50 percent of all data points. It follows that the lower and upper ends of a box depict the first and third quartile, respectively, and that the remaining 25 percent of data points on each side lie outside the boxes. The lower and upper T-shaped whiskers end at the point of 1.5 times the IQR, unless the data points do not range as far, and any points outside are identified as outliers and can be seen outside of the T-shaped whiskers.

The indices are ranked in descending order of cumulative returns over the analysed time span and we see an almost normal distribution for all seven time series, which is important regarding the selection of the GARCH model for the volatility analysis. Comparing the indices, it becomes clear that four out of the six country indices outperformed the MSCI World, the latter exhibiting a negative median and mean. The similar development of the Nikkei and the MSCI World observed by the graphs are supported by similar boxplots, however, the latter reveal that the Nikkei performed better and has a positive mean as opposed to the MSCI World. As these aspects are easier to identify by means of the boxplot diagram it will be part of following sections.

More important than the analysis of price time series, however, is the consideration of market risk and volatility. The volatility of stock markets is influenced by a myriad of

factors that play a significant role in shaping the dynamics of financial markets, a well-studied nexus in research. Firstly, macroeconomic indicators such as interest rates, inflation rates, and GDP growth rates as well as overall economic stability have a substantial impact on stock market volatility. Changes in these variables can affect the perceived accuracy of market predictions and investor sentiment, leading to fluctuations in stock prices. Additionally, geopolitical events, such as trade disputes, political instability, or major policy changes, can trigger volatility in stock markets, as they introduce uncertainty and alter market expectations. This is something we might expect for the SSE to reflect because of the US-China trade war. On the other hand, consistent and transparent government policies, especially in areas such as taxation, regulation, and trade, can provide certainty to investors and reduce market volatility.

Officer (1973) shows the strong relation of the volatility of such macroeconomic factors and stock market volatility while Schwert (1989a) finds that in times of recessions many aggregate economic factors are more volatile, especially financial asset returns and measures of real economic activity. Stock market volatility, however, does not show long-term effects from shocks like financial crises or wars (Schwert, 1989b). This supports our focus on the time span around the RCEP agreement's announcement and entry into force while neglecting the relatively recent COVID-19 economic crisis as we do not expect long-term effects on the stock market volatility.

Furthermore, investor behaviour and sentiment, driven by factors like risk appetite, market sentiment, and herd mentality, can amplify market volatility. The level of market liquidity, influenced by factors such as trading volume and bid-ask spreads, also plays a crucial role in determining stock market volatility. Finally, advances in technology and the widespread use of algorithmic trading have introduced new dynamics, where rapid information dissemination and high-frequency trading can exacerbate market volatility.

It is important to note that while these factors can contribute to reducing volatility, no market is entirely free from fluctuations. Stock markets inherently involve risks, and periodic volatility is a normal part of the investment landscape. Overall, uncertainty plays a crucial role and prices of speculative assets should react quickly to new information about economic events (Schwert, 1989a). Therefore, we expect stock market volatility to reduce around the time of knowing the future date of RCEP's entry into force as well as at the time of its entry into force itself.

Figure 4.7: Volatility comparison of China's major index (SSE) vs. the MSCI World index

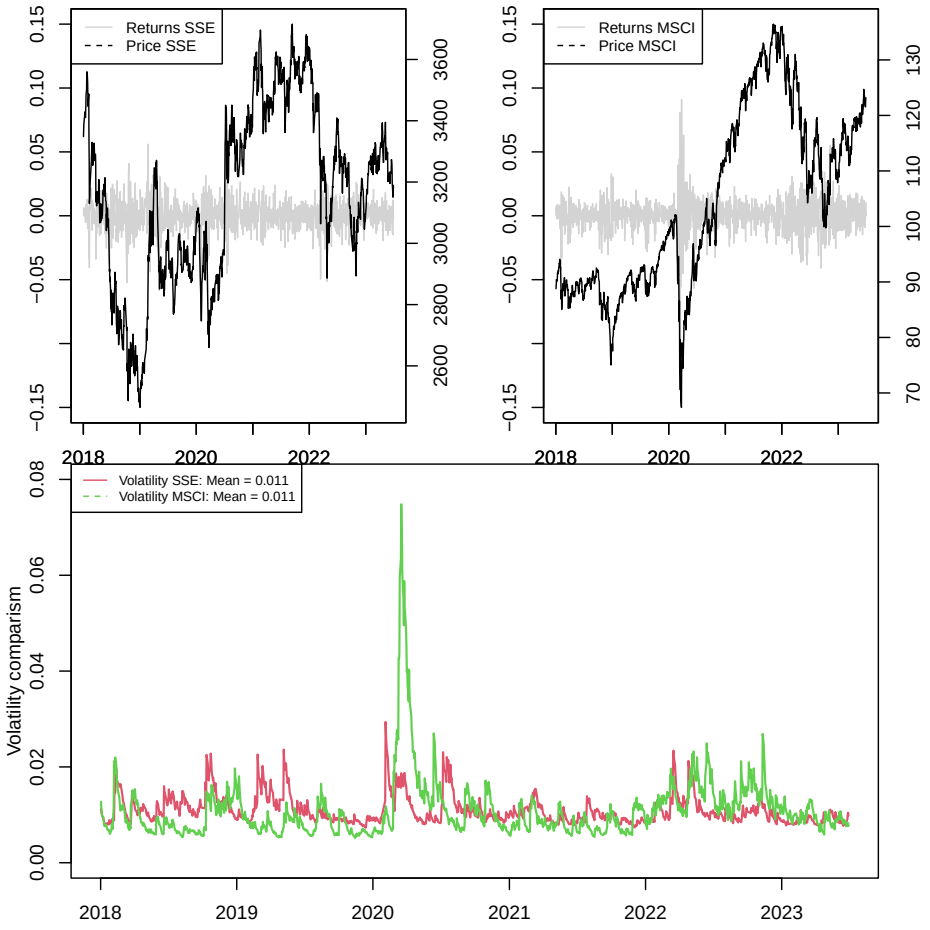


Figure 4.7 again displays the development of the stock price and returns together with the historic volatility of the Shanghai Composite index in direct comparison with the MSCI World as the reference index. The calculation of historic volatility also uses the GARCH(1,1) model and daily data (see Section 4.2). The lower diagram illustrates that the volatility of the Chinese index is on a slightly higher level than the MSCI World over long periods and therefore, at these times, more uncertain. During other periods, such as the second quarter of 2020 the second half of 2022, we observe the opposite. For the latter point in time we see higher fluctuations of volatility for the MSCI World. Overall, the SSE and the MSCI World observe an equal mean volatility. We clearly see the dominant effect of the COVID-19 pandemic in the first months of 2020, which does not last long. This is in line with our hypothesis derived earlier as stock market volatility does not show long-term effects from shocks like financial crises. Moreover, for the SEE we can reject

the hypothesis of reducing volatility due to RCEP as at the time of entry into force and shortly afterwards we see a rise in volatility.

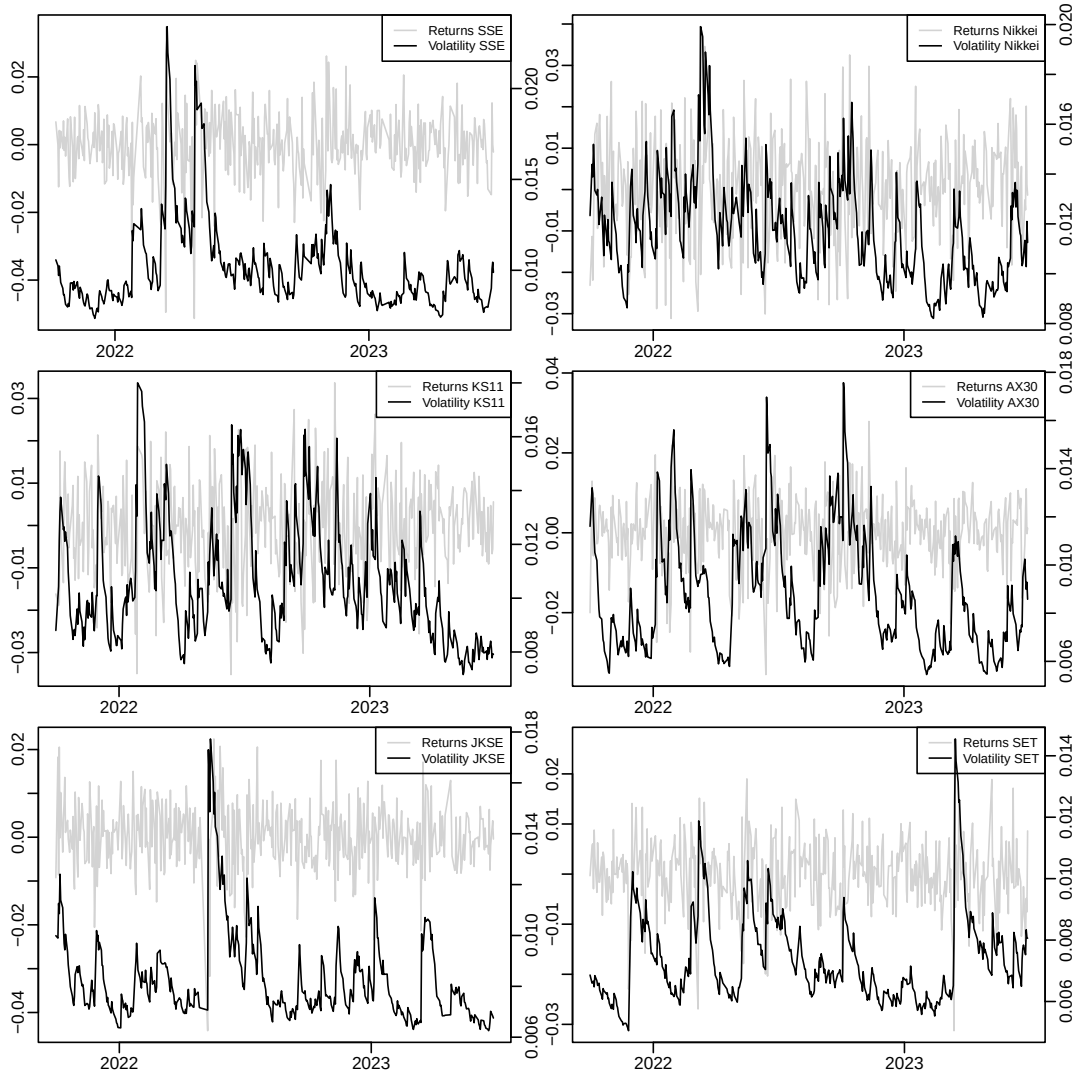
In order to examine the volatility for all indices, Table 4.4 shows the mean volatility values calculated by the mentioned GARCH(1,1,) model for the six RCEP indices together with our reference index for all half-year periods of the years 2020, 2021, 2022 and the first half of 2023. Some further details on the GARCH calculation for the two largest indices of the RCEP zone, SEE and Nikkei225, as well as for the MSCI World as the reference index can be found in Appendix C.

Table 4.4: Volatility comparison of RCEP's major indices over time

Volatility	CHN (SSE)	JPN (Nikkei)	KOR (KS11)	AUS (AX30)	IDN (JKSE)	THA (SET)	Reference (MSCI)
2020-HY1	0.0123	0.0166	0.0172	0.0180	0.0153	0.0181	0.0209
2020-HY2	0.0117	0.0106	0.0110	0.0100	0.0105	0.0104	0.0102
2021-HY1	0.0102	0.0120	0.0110	0.0081	0.0095	0.0090	0.0086
2021-HY2	0.0094	0.0114	0.0094	0.0073	0.0083	0.0073	0.0082
2022-HY1	0.0121	0.0132	0.0114	0.0101	0.0090	0.0079	0.0143
2022-HY2	0.0102	0.0117	0.0112	0.0095	0.0080	0.0070	0.0138
2023-HY1	0.0089	0.0104	0.0094	0.0074	0.0076	0.0075	0.0094

Comparing the development of volatility for the different indices over time, we see that for the Chinese, Japanese, South Korean as well as Australian financial market, volatility increases from 2021 to the first half of 2022 and then reduces to reach the lowest value in 2023. The magnitude of changes is very similar for these indices, even though the markets observe some differences in their level of volatility as the Chinese, Japanese and South Korean markets are more volatile than the Australian financial market. Regarding Indonesia, for which RCEP entered into force in the beginning of 2023, changes in volatility are not as pronounced and the volatility reduces over time. The volatility of the Thai financial market changes only slightly in the last four half-year periods. Over the same time, the reference index shows the most pronounced rise from 2021 to 2022 as well as decline to 2023. A relatively low volatility at the points of interest regarding RCEP and its entry into force indicates relatively little movement of the markets, which can potentially be based on expectations surrounding the agreement, for instance, in the form of a wait-and-see behaviour.

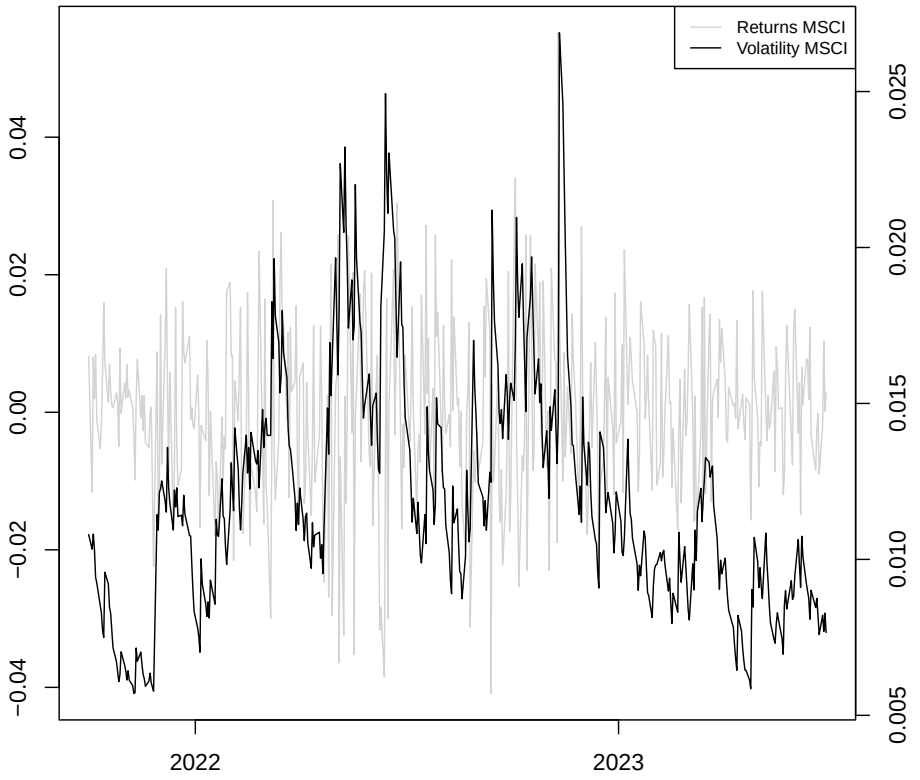
Figure 4.8: The volatility and returns time series of RCEP's largest financial markets



Overall, we see decreasing volatility at the time of knowing the future date of RCEP's entry into force as well as at the time of its entry into force itself, some indices' volatility declining to their lowest levels in years. As discussed, many factors influence this pattern such as the COVID-19 pandemic and its consequences and we therefore cannot infer causality. In order to see short-term changes that might be more indicative of an RCEP effect at the two main periods of interest, Figure 4.8 illustrates the development of volatility (right axis) for our six financial market indices from October 2021 to the end of the first half of 2023 together with the indices' returns (left axis). We can thus examine the development for the recent past, starting with the time when the imminent entry into force of RCEP was known, analogously to the analysis of the cumulative returns.

Analogously, Figure 4.9 shows this development for our reference index. The indices depicted in Figures 4.8 and 4.9 observe clear differences in the volatility development, their levels and we do not see a pattern of reduced volatility at the time of or after RCEP's entry into force. Thus, we cannot identify a specific effect that is highly indicative of a large RCEP impact on these country indices, even though RCEP is likely to be a contributing factor for the overall pattern of reduced volatility that we saw earlier. The following sector level analyses will include this approach and is more insightful in this regard.

Figure 4.9: The volatility and returns time series of the reference index MSCI World



4.3.3 Analysis on industry-level

The analysis of an entire index is, of course, diluted to some extent. Because of the many heterogeneous industries a market index is composed of, its development is often somewhat smoother than that of individual industries. Hence, we now turn to analyse the stock market development of the automotive industry, the electronic sector as well as the chemical industry, by order of RCEP members' international TiVA.

In order to approximate the industries we analyse the five most influential RCEP companies in terms of revenue for each of the three industries. This allows for good interpretability

and we expect the largest impact of RCEP, for instance in terms of additional trade volume, for the largest companies of an industry. For comparison, for each sector we add a reference in the form of an ETF for the respective industry. Analogously to the analysis of the country indices, after examining the longer time span regarding stock market performance we turn to the shorter time span of October 2021 to March 2022 for the event analysis of RCEP for each of the sectors.

The automotive industry

We first analyse to what extent RCEP has an effect on the automotive industry's stock market and its development. For this purpose, we analyse those five companies in the RCEP zone with the highest revenue in the automotive sector, namely Toyota, Hyundai, Honda and Nissan as well as SAIC Motor and compare them with a benchmark ETF, the iShares STOXX 600 Automobiles.

Table 4.5 lists these along with variables of interest. Revenue is depicted for 2021, although financial years of companies sometimes differ in their reporting and can overlap with other years for a few months. All five companies are among the ten largest automotive companies in the world. The reference ETF consists of holdings of the largest European stock-listed companies of the industry and contains large investments in Mercedes-Benz (22.2 percent of ETF), Stellantis (14.2 percent of ETF), BMW (13.6 percent of ETF) as well as Ferrari (13.3 percent of ETF)[11].

Table 4.5: RCEP's major companies of the automotive industry

Company	Country	Revenue in 2021 (in $ bn)	Stock Symbol
Toyota	JPN	245	7203.T
SAIC Motor	CHN	121	600104.SS
Honda	JPN	110	7267.T
Hyundai	KOR	99	005380.KS
Nissan	JPN	74	7201.T
iShares STOXX 600 Europe Automobiles & Parts	ETF	n/a	EXV5.DE

[11]Shares of ETF according to Yahoo Finance (2023). The ETF's company holdings are adapted over time.

Refer to Table C2 in Appendix C for the coefficients of the GARCH model together with their significance levels.

Figure 4.10 shows the stock price development of the top five RCEP automotive companies together with their returns series and in comparison with the reference ETF. The left axis depicts the returns while the right axis indicates the stock price in local currency, which is Euro for the ETF. In comparison to the indices of the economies, we see that company stocks are much more volatile. Both indicators develop very differently for the five companies as well as for the reference ETF. In fact, we see very different developments of stock price for the three Japanese companies Toyota, Honda and Nissan, despite them sharing the same economy. Moreover, the last 1.5 years represent the time of the RCEP agreement being effective, for which we see a differing development.

Figure 4.10: The price and returns time series of RCEP's largest automotive companies

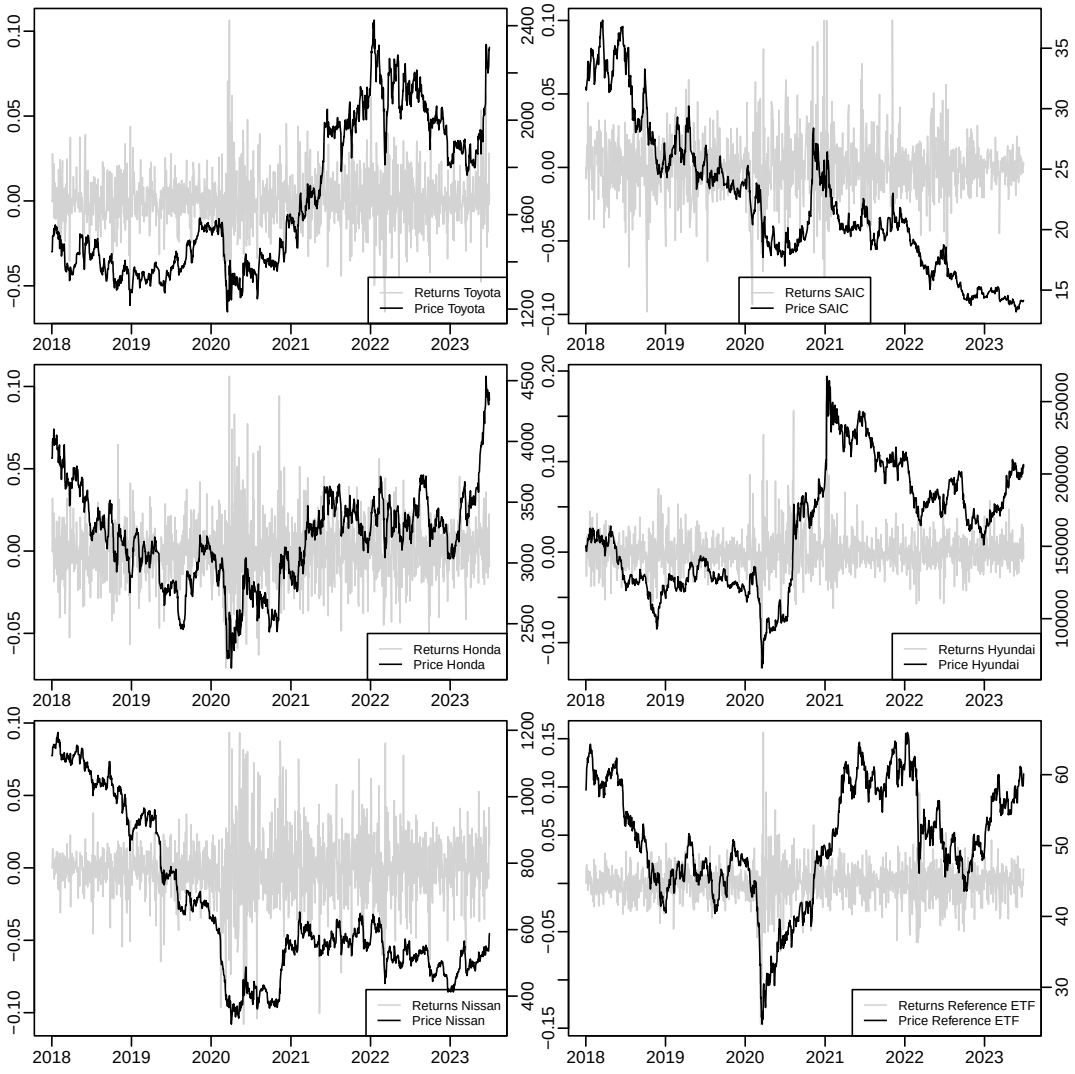


Figure 4.11 depicts the correlation measures between the different stocks together with the reference ETF for the same time span as Figure 4.10. The reference ETF exhibits low correlations with each of the company stocks. This is, of course, influenced by the large share of European companies the ETF is composed of. The highest correlation can be observed between Toyota and Honda, Toyota and Nissan as well as Honda and Nissan, all of which are Japanese. Chinese SAIC has a low correlation with all others, which is also true for South Korean Hyundai, that correlates slightly higher with the Japanese company's stocks than SAIC. As discussed, many factors play a role in this context. Therefore, in order to observe a potential RCEP effect, we now turn to a shorter, more recent time span analogous to Figure 4.5.

Figure 4.11: Correlation matrix - automotive industry

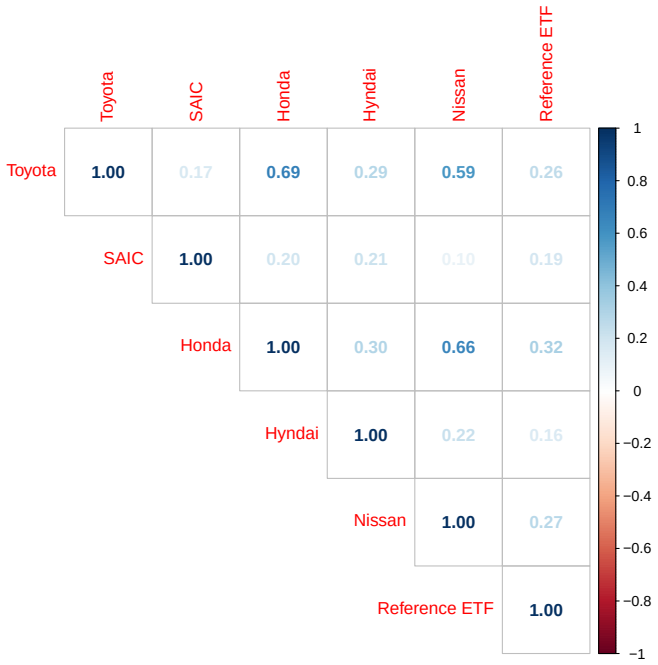
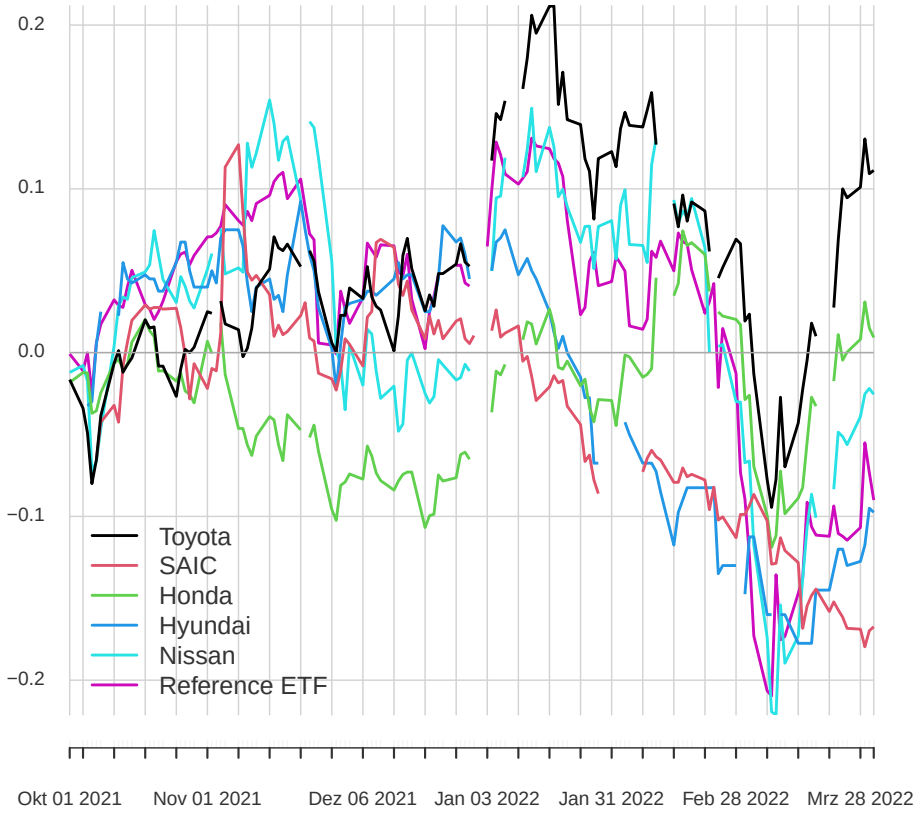


Figure 4.12 depicts the cumulative returns of the automotive industry for the chosen period from October 2021 to March 2022. As pointed out, this enables to see a potential effect around the time of knowing the imminent entry into force of RCEP beginning of November 2021 while being able to see a potential effect of the entry into force itself in the beginning of 2022. The first point of interest in the beginning of November is characterised by rising cumulative returns for the first two to three weeks (depending on the company) after the future entry into force of RCEP was known. Honda's returns are negative and

decreasing at this time, however, and SAIC's cumulative returns increase steeply in the beginning and fall just as much thereafter. The development is broadly consistent with that of the reference ETF, speaking against a distinctive RCEP effect on the returns. Nevertheless, it is possible that investors' expectations regarding the upcoming entry into force of RCEP lead to a rise of many of the industry's company stock returns, including those of European companies and therefore also the reference ETF. Several European automotive companies are heavily invested in the RCEP zone and will thus benefit from local RCEP provisions. Any causality is, however, speculative.

Figure 4.12: Short-term stock market performance of the automotive industry - cumulative returns (10/2021 - 03/2022)



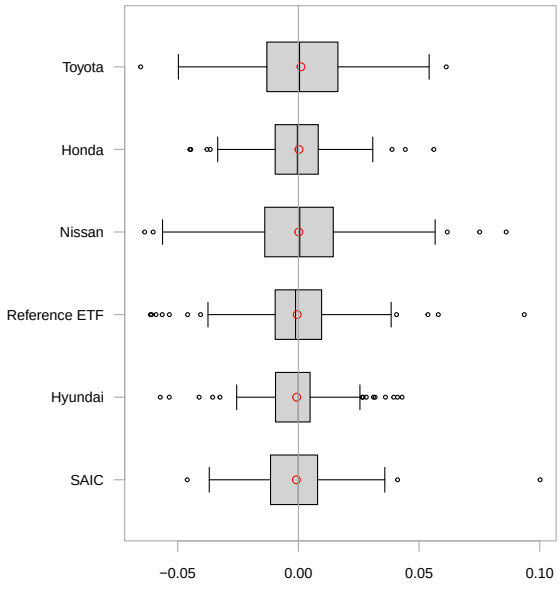
For the second time of interest in the beginning January, we see a substantial rise in returns that is most prominent for the three Japanese companies Toyota, Honda and Nissan. Cumulative returns of Chinese SAIC and South Korean Hyundai fall below zero after a short rise. This is in line with expectations for the latter as RCEP entered into force for South Korea later on February 1st and at that time we do see a short-term increase in returns as opposed to the other companies' returns. Even though we cannot infer causality, these developments are indicative of a potential short-term RCEP effect

on the stock returns of the automotive sector shortly after entry into force. After several weeks, the price time series decrease for all stocks as well as the reference ETF.

Figure C5 in Appendix C depicts the cumulative returns of the automotive industry against its reference ETF as a baseline over the same period and illustrates the similarity of the developments described.

Figure 4.13 shows the corresponding boxplots, illustrating that over the period of expecting the imminent entry into force of RCEP and the first months of its effect, the stocks of Japanese Honda, Toyota and Nissan (in descending order of cumulative returns) outperformed the reference ETF. The latter, together with Hyundai and SAIC Motor, observe negative median and mean values. We again see the that a normal distribution of the data can be assumed, while there is a higher scattering of the measurement values compared with the market indices with SAIC motor, for example, showing a positive outlier of a 10 percent increase in returns on one day. This is according to the expectation of company stocks in relation to indices for an entire financial market. Moreover, we observe outliers for all stocks and in both directions, showing comparatively very high and low returns, or large gains and losses, respectively. These observations add to the understanding of the automotive industry stocks' performance around the time of RCEP's entry into force, however, are not able to depict the development over the six-month period nor a specific short-term effect of RCEP on stocks' returns.

Figure 4.13: Short-term stock market performance (returns) of the automotive industry - boxplot (10/2021 - 03/2022)



For this purpose, we now turn to analyse volatility of the companies' stocks. Before comparing all five companies among each other, against the reference ETF as well as over time, let us take a detailed look at the development of Toyota, the largest automotive company of the RCEP zone as well as worldwide in terms of sold cars (German Volkswagen is the largest in terms of revenue). Figure 4.14 illustrates a broad indication over the past five years in terms volatility of Toyota and the reference ETF. The diagram shows that the volatility of Toyota is on a lower level than the reference ETF and therefore less uncertain, something very unexpected. Nevertheless, we can reject the hypothesis of reducing volatility due to RCEP, since at the time of entry into force and shortly afterwards we see a rise in volatility and an overall high fluctuation. Moreover, for both volatilities we see phases of low and high measurement values over the five-year period.

Figure 4.14: Volatility comparison of Toyota vs. the reference ETF

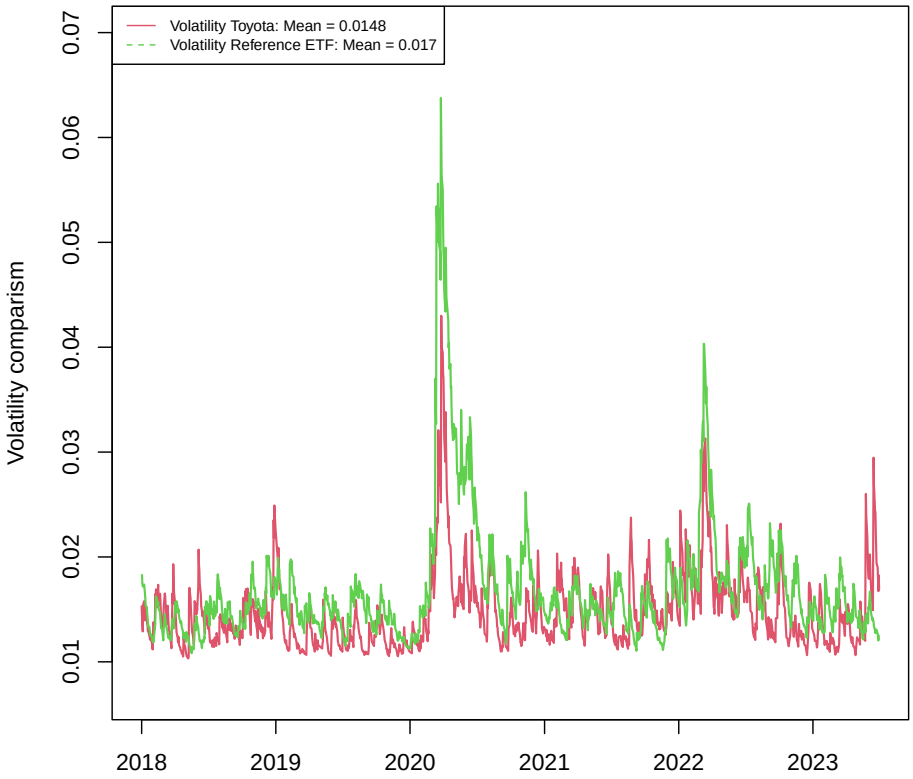


Table 4.6 shows the volatility of the five automotive companies together with the benchmark ETF for 2021, 2022 and the first half of 2023, illustrating the sequential phases relevant for stock market expectations regarding RCEP and its entry into force in terms of its mean volatilities.

The data exhibits higher levels than seen for the market indices, which is as expected

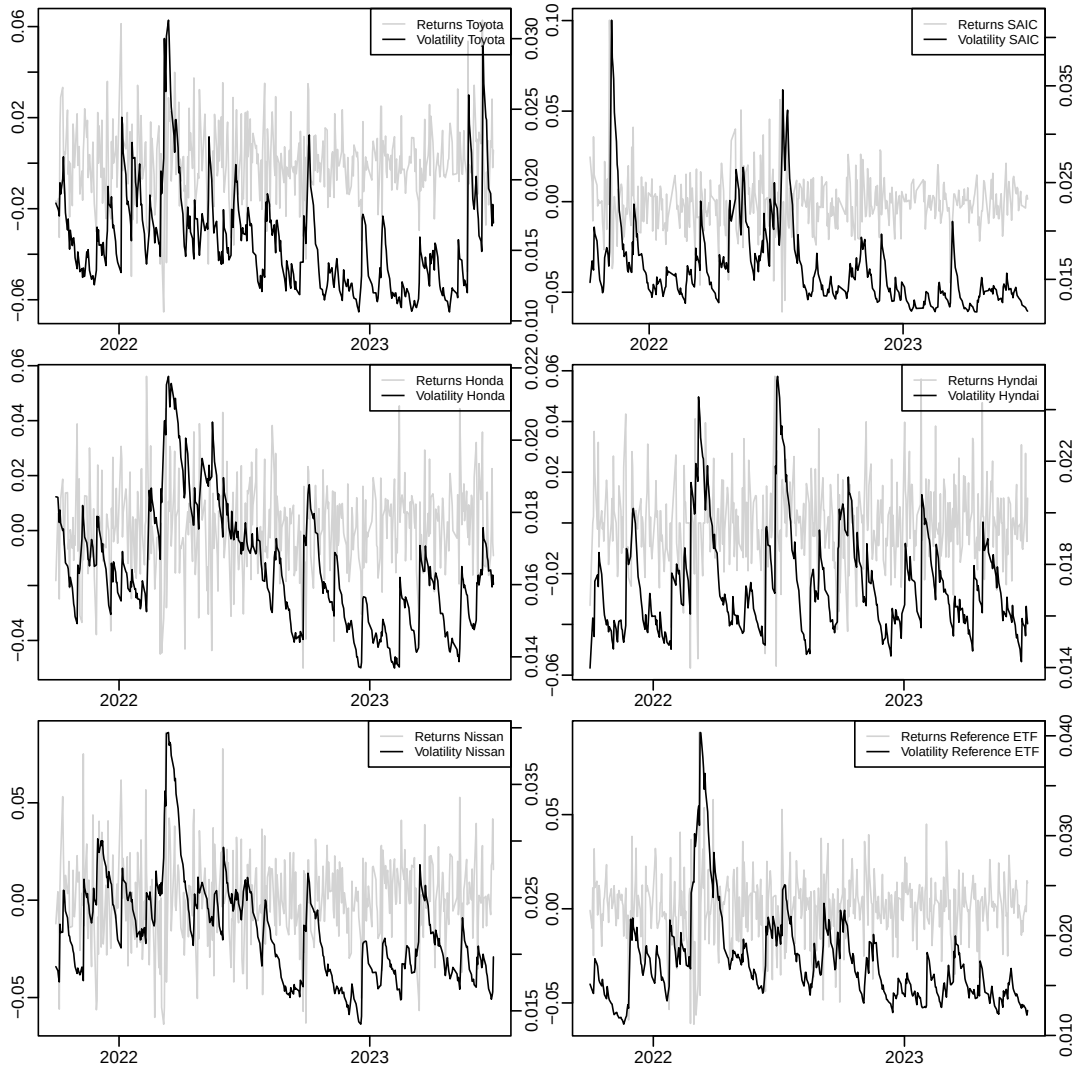
Table 4.6: Volatility comparison of RCEP's major automotive companies over time

Volatility	Toyota	Hyundai	Honda	Nissan	SAIC	Reference ETF
2020-HY1	0.0187	0.0229	0.0244	0.0295	0.0326	0.0280
2020-HY2	0.0143	0.0235	0.0218	0.0268	0.0294	0.0177
2021-HY1	0.0151	0.0212	0.0182	0.0257	0.0236	0.0149
2021-HY2	0.0149	0.0193	0.0168	0.0156	0.0231	0.0151
2022-HY1	0.0185	0.0172	0.0181	0.0175	0.0260	0.0206
2022-HY2	0.0144	0.0167	0.0160	0.0176	0.0198	0.0176
2023-HY1	0.0145	0.0133	0.0153	0.0169	0.0197	0.0147

for stocks of single companies. We also see that the company stocks' volatility levels differ more than those of the country indices. Toyota's volatility is relatively stable across the half-year volatilities while that of Hyundai is clearly decreasing for every half-year period. Japanese Honda and Nissan show a decline over time, with increases in 2022 before declining again towards 2023, which is similar to the stock of Chinese SAIC motor, although on a different level. The reference ETF depicts a mixed development. Overall, we see decreasing volatility over time for the half-year periods as well as relatively low values for the last two half-year periods, corresponding to the time of knowing the future date of RCEP's entry into force as well as at the time of its entry into force itself.

Let us look at the more detailed volatility development of the companies' stocks, illustrated by Figure 4.15 together with the companies' returns. Although some of the graphs exhibit a decline for some parts of late 2021 and around the time that RCEP's imminent entry into force became knowledgable in the beginning of November, the graphs exhibit substantially different developments at that time. Moreover, the reference ETF also shows a decline of volatility around that time. Therefore, even though RCEP might have contributed to a declining volatility at that time, several aspects speak against a distinctive RCEP effect. At the time of RCEP's entry into force we see a rather increasing volatility, speaking against a volatility-reducing effect of RCEP. The returns' development exhibit that the rising volatility is not based on clearly rising returns at the points of interest, which could have been explained by an RCEP effect. In addition, the fact that the volatility of the reference ETF develops similarly supports this and indicates that other factors than RCEP might cause this development. Over time, however, we do see the reductions in volatility shown by the half-year periods in Table 4.6, which is most pronounced for Chinese SAIC motor. RCEP can be a contributing factor.

Figure 4.15: The volatility and returns time series of RCEP's largest automotive companies



The computer, electronic and electrical equipment industry

We now turn to analyse a potential RCEP effect on the stock market of the electronic industry, which has a broader profile compared with the automotive industry. As outlined in Chapter 3, it comprises diverse activities including the production of electronic components, such as microprocessors or integrated circuits, the manufacture of computers and computer peripherals, consumer electronics, magnetic and optical media as well as irradiation and electromedical equipment, among others (UN, 2008).

As depicted by Table 4.7, analogously to the previous section, the five largest companies headquartered in the RCEP zone operating in this field are Samsung Electronics, Sony,

Hitachi, Panasonic as well as Xiaomi. Revenue is depicted for 2021, although financial years of companies sometimes differ in their reporting and can overlap with other years for a few months. Many of the industry's companies worldwide are located in the RCEP region or Asia in general. While Chinese Huawei is omitted due to missing data, the large Taiwanese company Hon Hai Precision Industry would have made the top five with approximately $ 212 bn in revenue in 2022 had Taiwan become a member of RCEP. While the agreement became effective for Samsung only on February 1st, for all others it did so in the beginning of January. Our benchmark is the iShares Global Tech ETF that consists of more than 100 holdings of stock-listed companies from around the world including large holdings of Apple (22.5 percent of ETF) and Microsoft (19.9 percent of ETF). It also contains small holdings of Samsung Electronics (2.4 percent of ETF) and Xiaomi (0.2 percent of ETF)[12].

See Table C3 in Appendix C for the coefficients of the GARCH model together with their significance levels.

Table 4.7: RCEP's major companies of the electronic industry

Company	Country	Revenue in 2021 (in $ bn)	Stock Symbol
Samsung Electronics	KOR	228	005930.KS
Sony	JPN	82	6758.T
Hitachi	JPN	73	6501.T
Panasonic	JPN	63	6752.T
Xiaomi Corporation	CHN	51	1810.HK
iShares Global Tech ETF	ETF	n/a	IXN

Figure 4.16 illustrates the stock price development of these companies together with that of the reference ETF. In comparison to the indices of the economies we again see that company stocks are much more volatile analogous to the automotive industry. The price time series of Sony and Hitachi develop relatively similarly compared with that of the reference ETF in terms of stock price, although on different levels, while the other companies' stock prices develop differently. Returns are most volatile for Xiaomi over time and least volatile for Panasonic, while the reference ETF is much less volatile nonetheless, as can be expected.

[12]Shares of ETF according to Yahoo Finance (2023). The ETF's company holdings are adapted over time.

Figure 4.16: The price and returns time series of RCEP's largest electronic companies

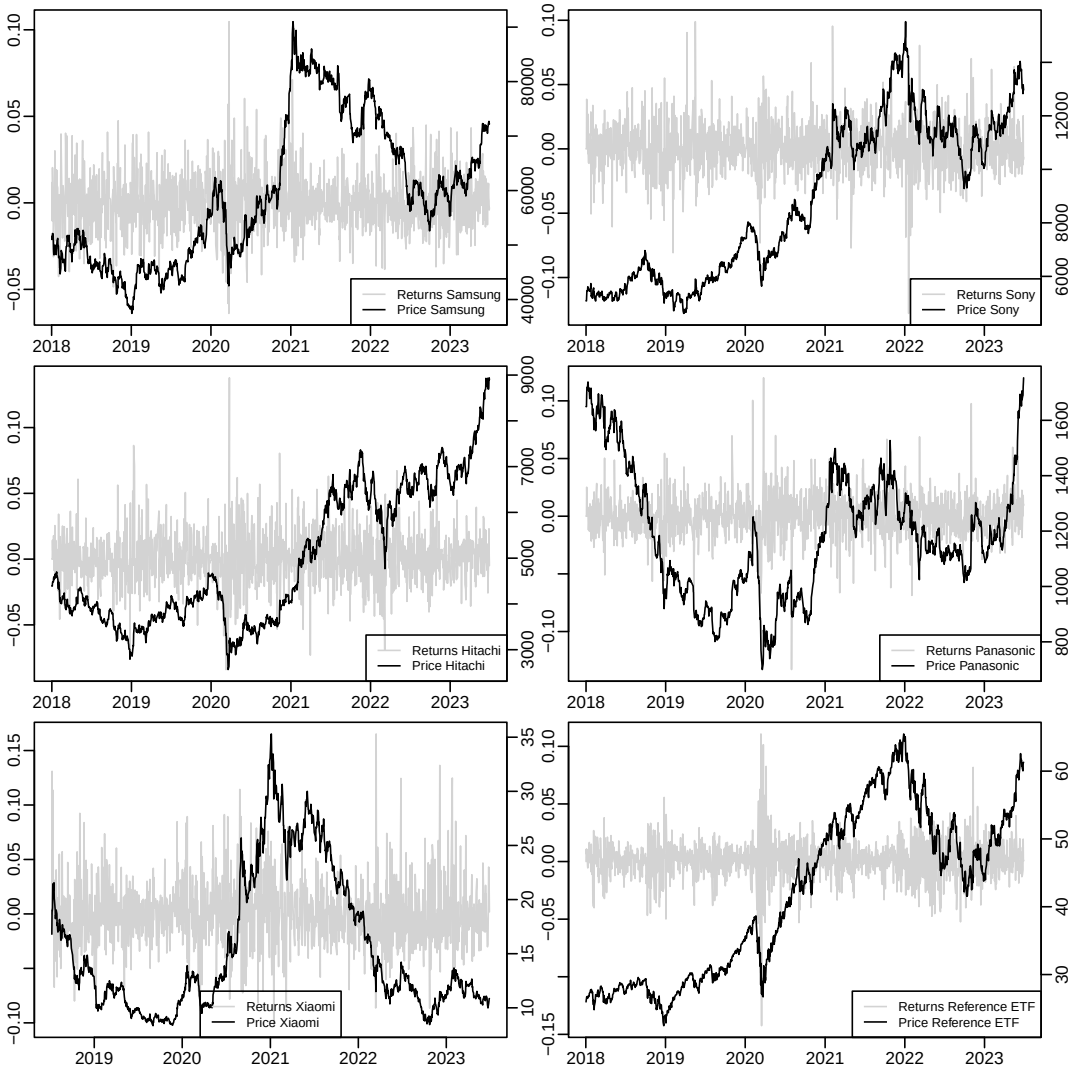
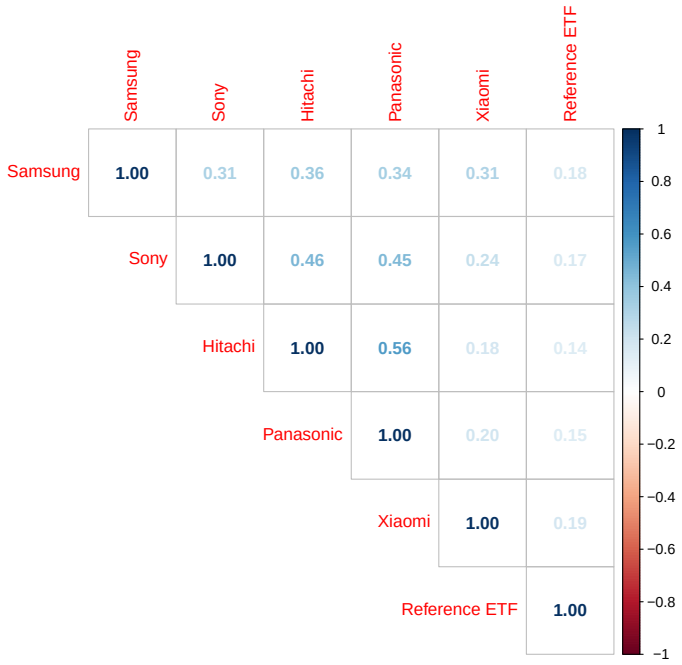


Figure 4.17 depicts the correlation measures between the different stocks together with the reference ETF, the latter showing to have a low correlation with each of the company stocks as well as on a lower level than the automotive industry. The highest correlation can be observed between Sony and Hitachi, Sony and Panasonic as well as Hitachi and Panasonic. These correlations are on a lower level than those of the automotive industry.

In order to analyse the times of interest regarding RCEP's entry into force, Figure 4.18 shows the cumulative returns of the companies over the six-month period until the end of March 2023, analogous to the section on the automotive industry. The first point of interest in the beginning of November is characterised by rising returns for the first two to three weeks (depending on the stock) before most companies' returns fall for some

Figure 4.17: Correlation matrix - electronic industry



time. This rise, however, is in line with that of the reference ETF, which speaks against a distinctive RCEP effect on the returns. Xiaomi's returns fall over most of the observed time span.

Regarding the second time of interest in the beginning January, we see a mixed development of returns, although most companies' stocks yield positive returns for some time between the first and second week of January, before most returns decrease for some time. Overall, Sony's returns develop very much in line with those of the reference ETF. Samsung's returns do not indicate a distinctive development in the beginning of February. Overall, however, we do see a tendency of positive returns of most companies' stocks during the periods of interest, potentially being based in parts on an RCEP effect.

Figure C6 in Appendix C depicts the cumulative returns of the electronic industry against its reference ETF as a baseline over the same period. We observe the close similarity of Sony and a tendency of increased distance to the returns of the reference ETF towards the end of the period. Compared with the automotive industry, we see a higher variability in the comparison of company stocks and the reference ETFs over the entire period.

Figure 4.18: Short-term stock market performance of the largest electronic companies - cumulative returns (10/2021 - 03/2022)

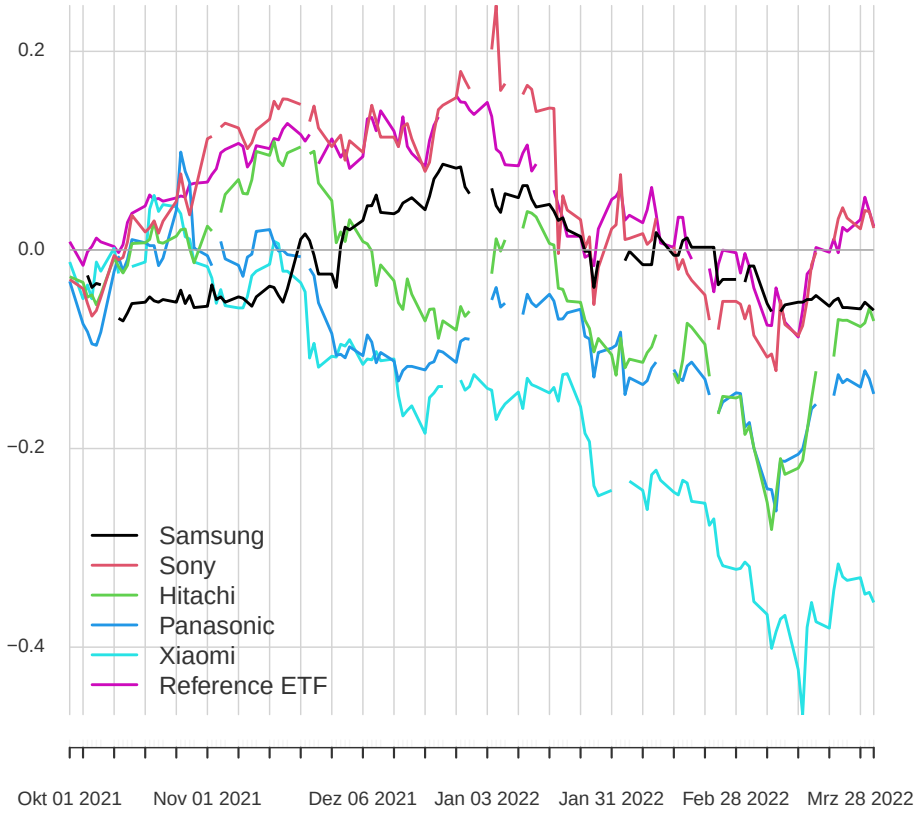


Figure 4.19: Short-term stock market performance (returns) of the largest electronic companies - boxplot (10/2021 - 03/2022)

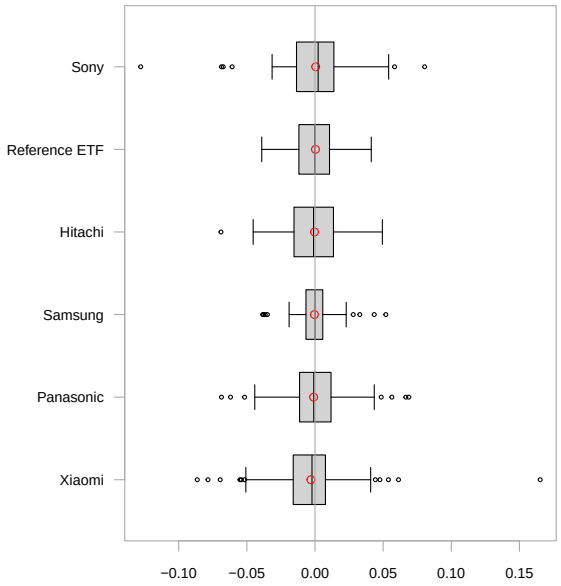


Figure 4.19 shows the corresponding boxplots, illustrating that for this industry merely two companies outperformed the reference ETF, namely the two Japanese companies Hitachi and Panasonic. Moreover, performance of the industry was relatively weak, as indicated by the mostly negative values of median and mean. The scattering of data points is similar compared with the automotive industry, although some outliers of Sony and Xiaomi are more extreme.

Before turning to the detailed volatility comparison for the industry, Figure 4.20 depicts the volatility of Samsung Electronics, the largest electronic company among RCEP members, and of the reference ETF. The diagram illustrates that the volatility of Samsung is very much on the level of the reference ETF, with less fluctuation. Therefore, it can be argued that Samsung's stock is associated with less risk, something unexpected. Moreover, we can reject the hypothesis of reducing volatility due to RCEP, since at the time of entry into force and shortly afterwards we do not see a distinctive change of pattern in volatility.

Figure 4.20: Volatility comparison of Samsung Electronics vs. the reference ETF

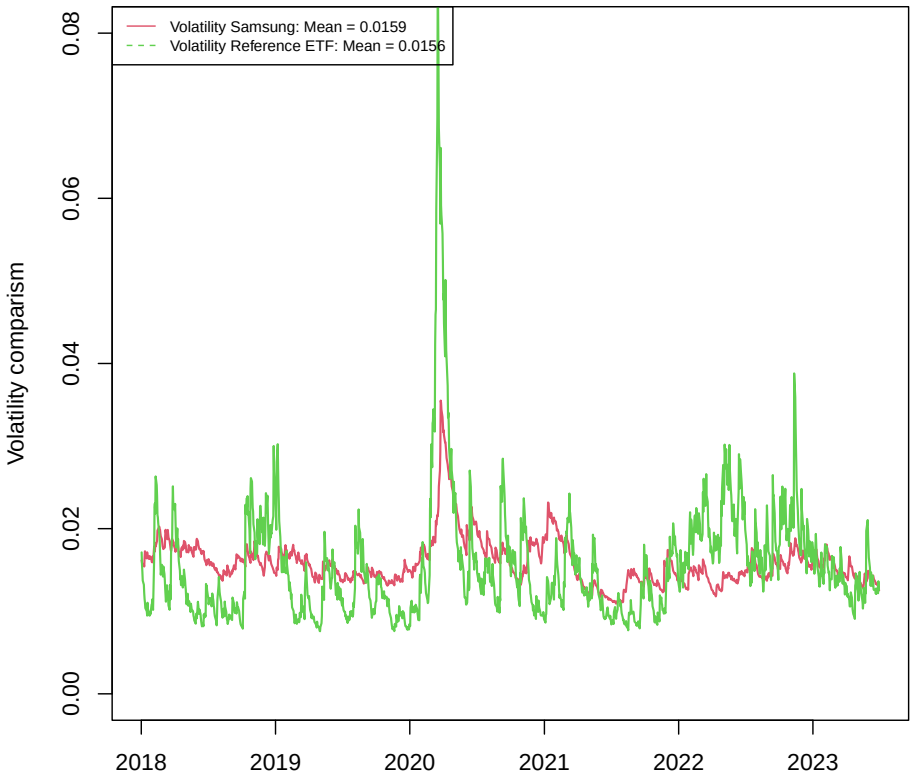
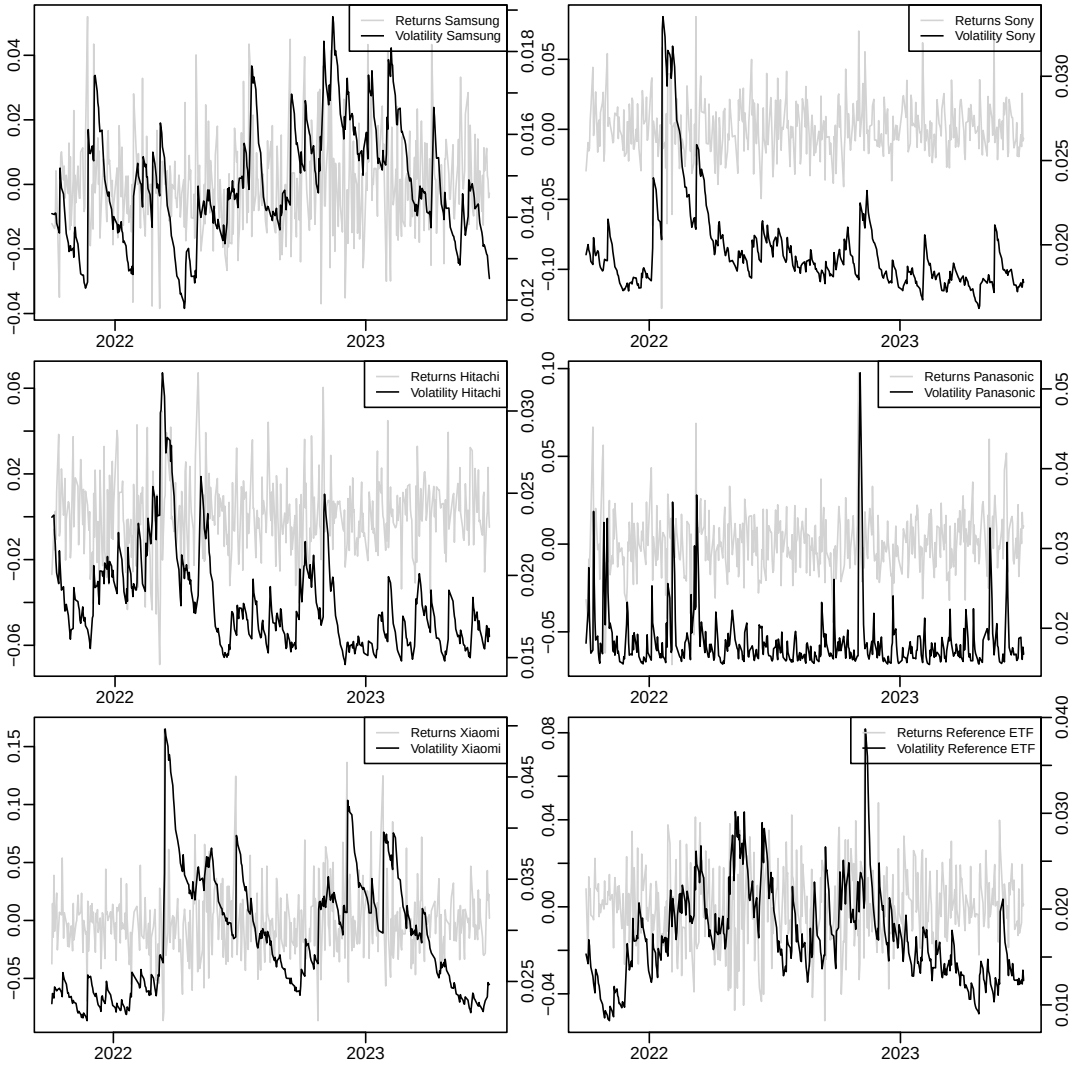


Table 4.8 illustrates the volatility of the five largest companies of the electronic sector together with the benchmark ETF for 2021, 2022 and the first half of 2023. We again see different developments and levels of the companies' stocks. Together with Figure 4.21 we can observe a pattern of reducing volatility especially for Sony and Hitachi. At the time when RCEP's imminent entry into force was known in late 2021, the graphs of Samsung Electronics, Sony, Hitachi and Xiaomi exhibit a decline in volatility, which is in line with the development of returns. This is true for the reference ETF, too, however. Moreover, for Samsung Electronics RCEP came into effect one month later. In the beginning of 2022 we see a tendency of increasing volatility for the companies' stocks. Thus, although RCEP might be a contributing factor for rising returns and reducing volatility in late 2021, we cannot clearly identify a distinctive RCEP effect. Furthermore, the volatility of the stock of Samsung Electronics shows a clear decline in 2023.

Table 4.8: Volatility comparison of RCEP's major electronic companies over time

Volatility	Samsung	Sony	Hitachi	Panasonic	Xiaomi	Reference ETF
2020-HY1	0.0208	0.0199	0.0245	0.0218	0.0301	0.0251
2020-HY2	0.0168	0.0185	0.0194	0.0187	0.0358	0.0148
2021-HY1	0.0156	0.0201	0.0196	0.0190	0.0308	0.0137
2021-HY2	0.0136	0.0187	0.0188	0.0186	0.0240	0.0116
2022-HY1	0.0139	0.0223	0.0208	0.0185	0.0313	0.0206
2022-HY2	0.0158	0.0193	0.0176	0.0180	0.0307	0.0190
2023-HY1	0.0149	0.0180	0.0166	0.0177	0.0288	0.0139

Figure 4.21: The volatility and returns time series of RCEP's largest electronic companies



The chemical industry

The chemical industry in the RCEP zone contains two large companies in terms of revenue that operate in other industries for most of their business, namely Chinese Sinopec and Petrochina. Although they had chemical industry sales of approximately $66 bn and $40 bn in 2021, respectively, this was merely a relatively small share of their total revenue, namely 16 and 10 percent, respectively (Tullo, 2022). Thus, we turn to chemical industry sales revenue as the metric for our company selection and with this definition the top five RCEP companies of the chemical industry are LG Chem, Mitsubishi Chemical, Hengli Petrochemical, Wanhua Chemical as well as Sumitomo Chemical (Tullo, 2022). Table 4.9 lists these along with variables of interest. Revenue is depicted for 2021, although financial

years of companies sometimes differ in their reporting and can overlap with other years for a few months. All of these companies made between 85 and 100 percent of their total sales revenue in the chemical sector. Our benchmark index is the iShares STOXX Europe 600 Chemicals, consisting of holdings of the largest European stock-listed companies of the industry. It contains large investments in Air Liquide (31.3 percent of ETF), BASF (14.2 percent of ETF) and Givaudan (9.6 percent of ETF)[13].

Refer to Table C4 in Appendix C for the coefficients of the GARCH model together with their significance levels.

Table 4.9: RCEP's major companies of the chemical industry

Company	Country	Revenue in 2021 (in $ bn)	Stock Symbol
LG Chem	KOR	37	051910.KS
Mitsubishi Chemical Group	JPN	31	4188.T
Hengli Petrochemical	CHN	28	600346.SS
Wanhua Chemical	CHN	23	600309.SS
Sumitomo Chemical Company	JPN	7.8	4005.T
iShares STOXX Europe 600 Chemicals	ETF	n/a	EXV7.DE

Figure 4.22 illustrates the stock price development of the top five RCEP companies of this industry together with that of the reference ETF. In comparison to the indices of the economies, we once more see that company stocks are much more volatile analogous to the other two industries analysed. Moreover, the companies of the chemical industry observe hardly any similarities in their development of stock price. Hence, their stock market valuation might be influenced significantly by different factors despite operating in the same industry.

[13]Shares of ETF according to Yahoo Finance (2023). The ETF's company holdings are adapted over time.

Figure 4.22: The price and returns time series of RCEP's largest chemical companies[14]

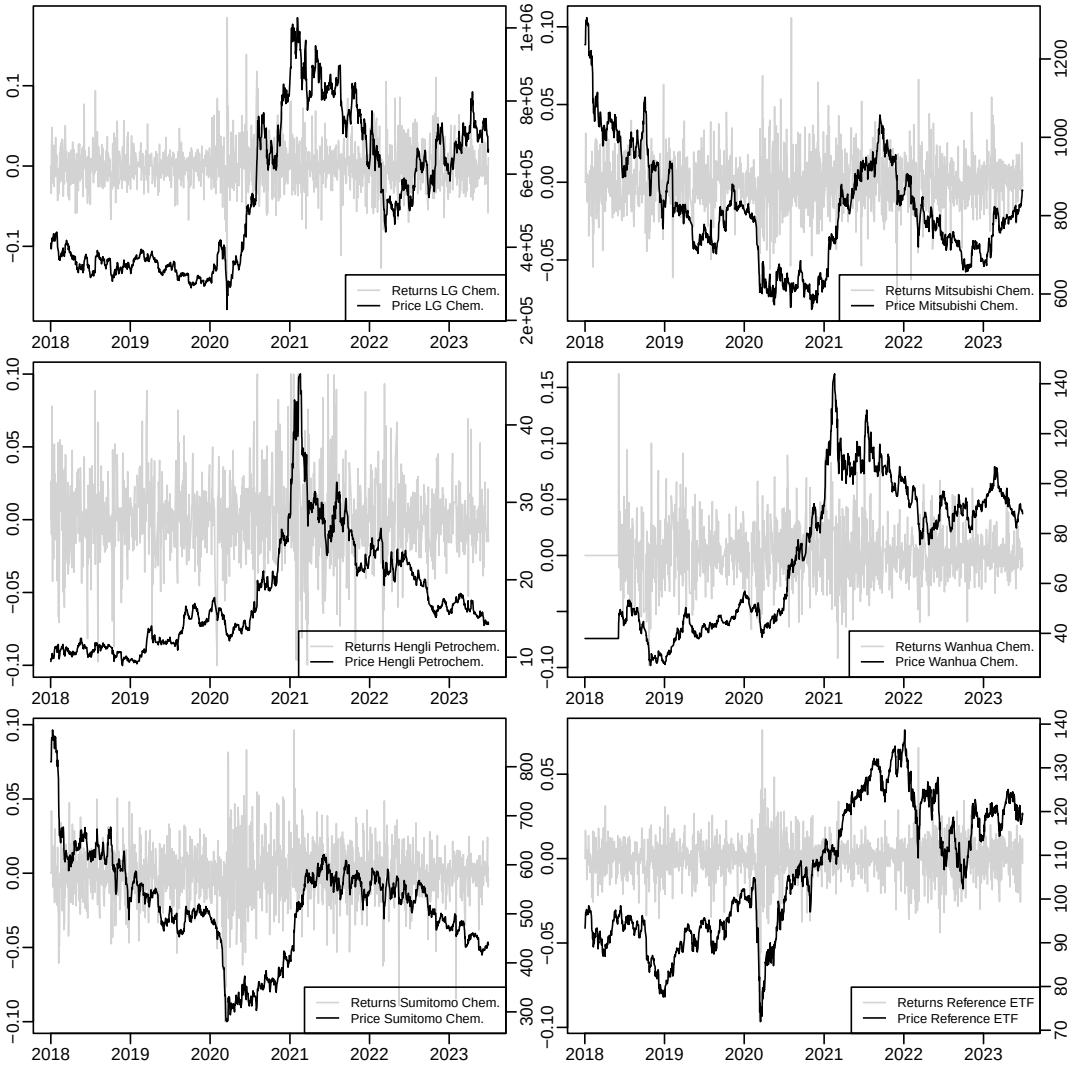


Figure 4.23 shows the correlation measures between the different stocks together with the reference ETF, the latter showing to have a low correlation with each of the company stocks. The highest correlation can be observed between the two Japanese companies Mitsubishi Chem. and Sumitomo Chem., and with 0.74 is higher than any other company correlation observed so far. Besides this correlation and that of the Chinese companies Hengli Petrochem. with Wanhua Chem., however, we see lower correlations compared with the two other industries analysed.

[14]Data for Wanhua Chemical are unavailable until June, 5$^{\text{th}}$, 2018.

Figure 4.23: Correlation matrix - chemical industry

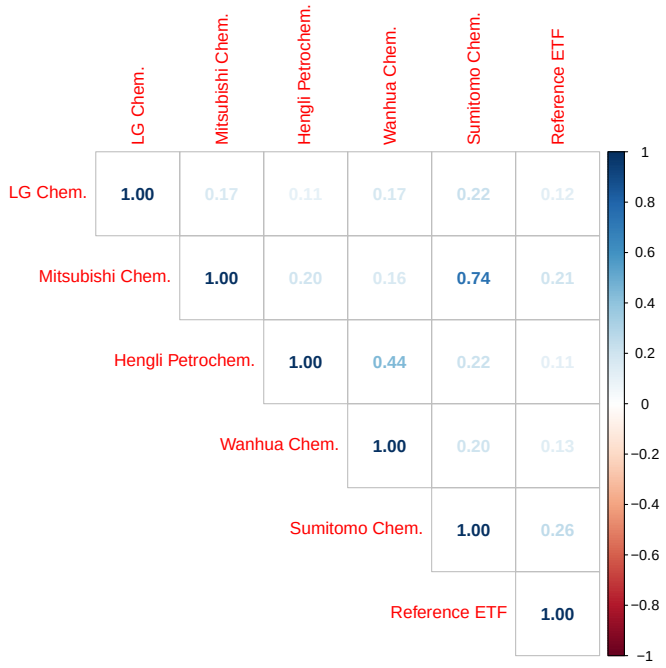
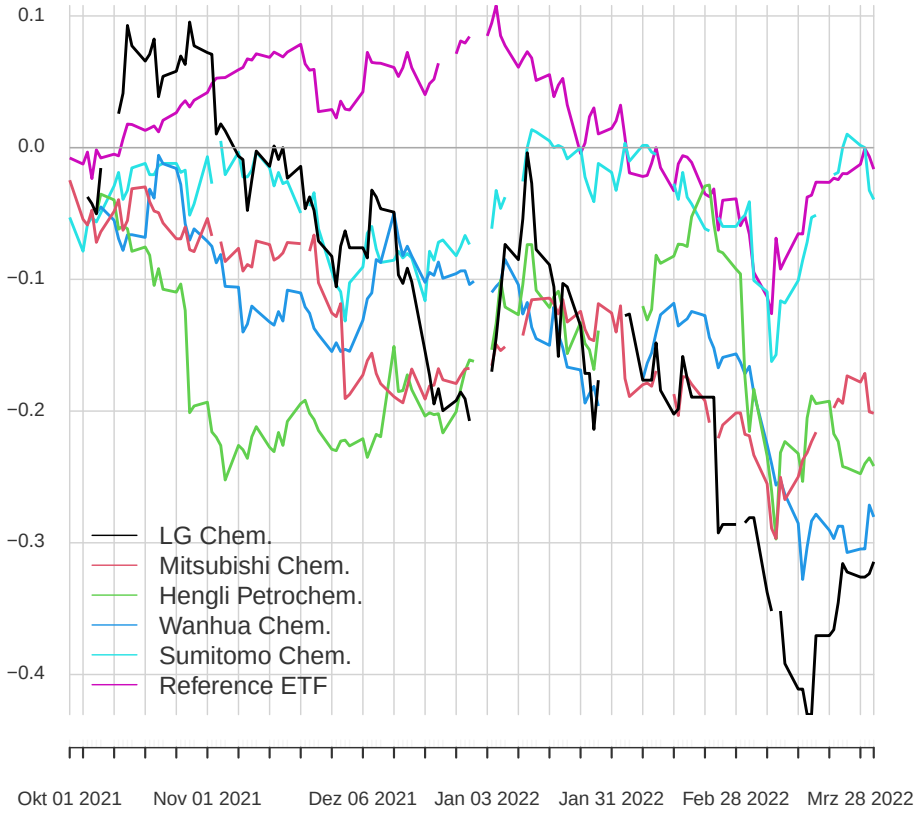


Figure 4.24 depicts the cumulative returns of the chemical industry for the chosen period. Leading up to the first point of interest in the beginning of November the returns develop very differently before the point when Mitsubishi Chem., Hengli Petrochem. as well as Wanhua Chem. seem to change course for a short period in the first two to three weeks after the future entry into force of RCEP was known. The reference ETF shows a different development at this time.

The second time of interest in the beginning January is characterised by a change of the previous pattern of mainly decreasing returns to now rising returns, except for Wanhua Chemical. The turning point varies from mid-December to the beginning of January and therefore, comes at the time of RCEP's imminent entry into force. The development of returns of LG Chem, Mitsubishi Chem. as well as Hengli Petrochem. are most similar, while the short-term effect is most prominent for LG Chem, for which however, the agreement became effective in February only. The subsequent changes in returns of both the companies' stocks as well as the reference ETF are more similar compared with the last quarter of 2021, before RCEP came into effect. Both of these factors indicate a potential RCEP effect on the returns of the chemical industry, namely the change of pattern for four of the five chemical companies at the time of RCEP's imminent entry into force and

Figure 4.24: Short-term stock market performance of the largest chemical companies - cumulative returns (10/2021 - 03/2022)



the overall increased similarity of the returns' development afterwards.

Figure C7 in Appendix C depicts the cumulative returns of the chemical industry against its reference ETF as a baseline over the same period and supports this development, illustrating the closer similarity of the stocks' returns in the beginning of 2022 until mid-March. Moreover, compared with the automotive industry, the overall variability of returns is again larger.

Figure 4.25 shows the corresponding boxplots, illustrating that over the period of expecting the imminent entry into force of RCEP and the first months of its effect, the stocks of Japanese Sumitomo Chem. and Mitsubishi Chem. as well as Chinese Hengli Petrochem. outperformed the reference ETF. We can see that the distribution of data points are very similar for Sumitomo Chem. and the reference ETF, while overall the scattering of data points is lower compared with the other two industries. Nevertheless, performance of the chemical industry over the observed period was relatively weak as can be seen, for instance, by mostly negative median and mean values.

Figure 4.25: Short-term stock market performance (returns) of the largest chemical companies - boxplot (10/2021 - 03/2022)

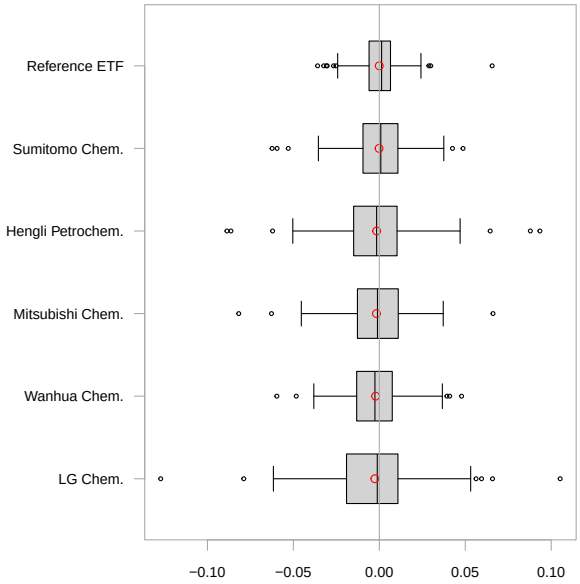
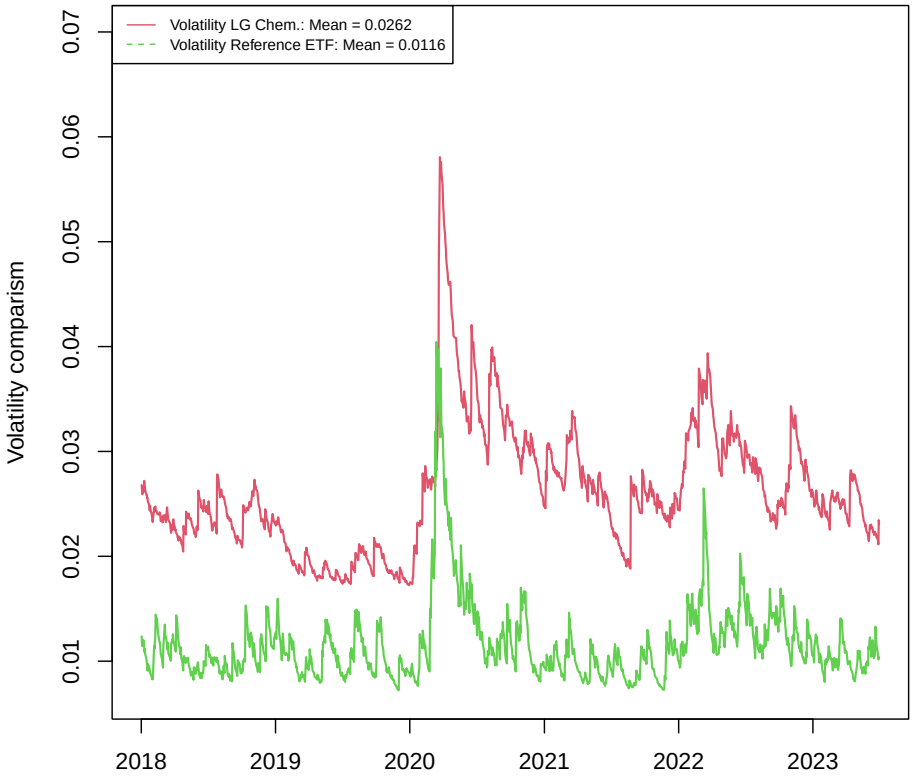


Figure 4.26: Volatility comparison of LG Chem vs. the reference ETF



Before turning to the detailed volatility comparison for the chemical industry, Figure 4.26 depicts the volatility of the largest chemical company LG Chem together with that of

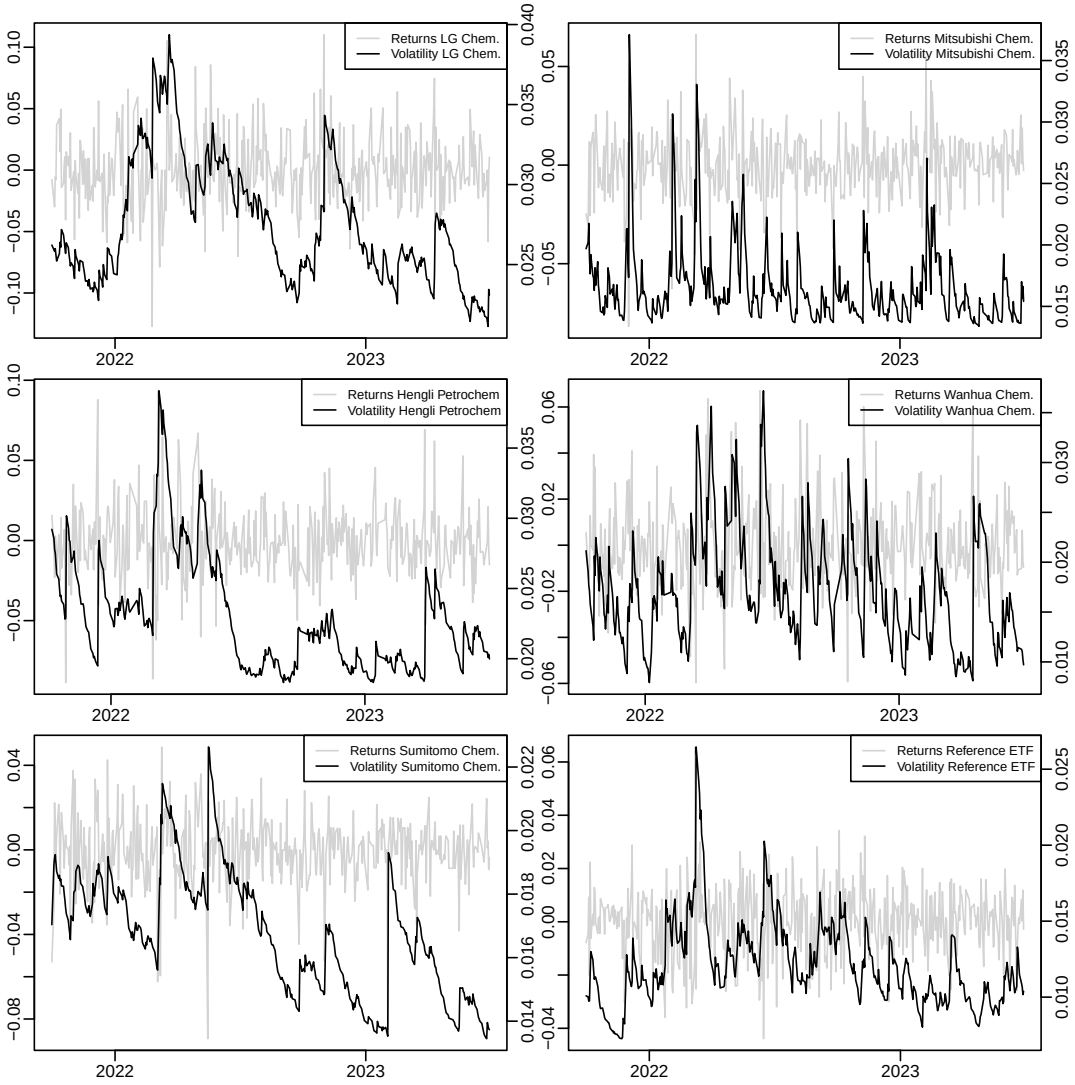
the reference ETF. The diagram illustrates that the volatility of LG Chem is on a much higher level than that of the reference ETF with a mean more than twice as high, while the graphs intersect merely briefly around the time of the COVID-19 outbreak in the beginning of 2020. Therefore, it can be argued that LG Chem's stock is associated with more risk. Moreover, we can reject the hypothesis of reducing volatility due to RCEP for LG Chem, as at the time of entry into force and shortly afterwards we see a rise in volatility.

Table 4.10: Volatility comparison of RCEP's major chemical companies over time

Volatility	LG Che.	Mitsubishi Che.	Hengli Che.	Wanhua Che.	Sumi- tomo Che.	Reference ETF
2020-HY1	0.0344	0.0193	0.0232	0.0234	0.0234	0.0180
2020-HY2	0.0320	0.0186	0.0270	0.0259	0.0214	0.0116
2021-HY1	0.0280	0.0176	0.0348	0.0310	0.0193	0.0097
2021-HY2	0.0240	0.0169	0.0285	0.0213	0.0182	0.0095
2022-HY1	0.0318	0.0177	0.0269	0.0203	0.0185	0.0143
2022-HY2	0.0276	0.0157	0.0202	0.0177	0.0159	0.0127
2023-HY1	0.0246	0.0158	0.0209	0.0143	0.0152	0.0104

Observing the detailed development of volatility through Table 4.10 and Figure 4.27 we see a similar pattern as for the other two industries in the sense that volatilities in later half-year periods are lower than in earlier half-year periods for all companies and the reference ETF while at the same time we see different levels and developments of the stocks' volatilities. Both Japanese companies Mitsubishi Chem. and Sumitomo Chem. observe clearly and gradually declining volatility over the half-year periods. Figure 4.27 depicts that that also LG Chem and Hengli decrease in their stocks' volatility measures over the period. For our two points of interest we see a decline in volatility matching the short-term rise in returns in late 2021, supporting our observation of a potential RCEP effect. The developments around our second point of interest at the beginning of 2022, however, do not match this as we see diverse trends.

Figure 4.27: The volatility and returns time series of RCEP's largest chemical companies



4.4 Conclusion

Due to the expected economic impact of RCEP and its provisions, as outlined above, we expect to see a rise in investment into RCEP markets, a common effect of FTAs, which is supported by literature, such as Park et al. (2021), who estimate that two percent of the RCEP effect is in the form of investment. This in turn can lead to higher stock prices. Moreover, the other categories of RCEP's impact can also have an investment-attracting effect, namely the reduction of non-tariff barriers on goods and services, which are estimated to make up two thirds of the effects of RCEP, tariff liberalisations as well as rules of origin, each projected to account for approximately 16 percent of RCEP's effect

(Park et al., 2021). Besides a direct investment-attracting impact these effects of RCEP can yield higher profits and increased dividends for shareholders, in turn leading to further gains for stocks.

In addition to this investment-attracting effect of the agreement itself, the financial stability of markets influence economic and political decisions. Moreover, as argued above, the development of financial markets causes economic growth by lowering the costs of transactions, thereby enabling an efficient allocation of funds, while competition of economic agents causes efficient specialisation of activities resulting in economic growth (Greenwood and Smith, 1997).

As pointed out by Officer (1973), the volatility of macroeconomic factors correlates strongly with stock market volatility while Schwert (1989a) argues that in times of recessions many aggregate economic factors especially financial asset returns and measures of real economic activity are more volatile. As discussed, because overall RCEP economically strengthens the region of its member countries, attracts investment and fosters economic growth, we expect decreasing volatility and risk of the stock market regarding the analysed indices and company stocks.

Furthermore, as discussed above, stock market volatility does not show long-term effects from shocks and prices of speculative assets should react quickly to new information about economic events (Schwert, 1989b). Therefore, we expect the stock market volatility to reduce and stock returns to increase around the time of knowing the future date of RCEP's entry into force as well as at the time of its entry into force itself, but merely for a short period of time.

In our stock market analysis of RCEP's largest economies, making up 94 percent of its economic power, we find that the indices of the Japanese and the South Korean as well as the Japanese and the Australian financial markets correlate most with each other. Moreover, we find that the cumulative returns of the six market indices grow apart after RCEP's entry into force, indicating a potential effect of the agreement that impacts the markets differently. The first few weeks of November, when RCEP's entry into force 60 days later was certain, were overall characterised by slightly rising returns of the indices, for which the expected entry into force can be a contributing factor. Nevertheless, for the country indices we reject our hypothesis of a short-term effect on stock returns after the agreement's entry into force, as we do not see a distinctive effect. The results indicate

declining volatility over the past years, especially for the Chinese, Japanese, South Korean as well as Australian financial market. We cannot infer causality, however, as there are many factors at play that are beyond the scope of this analysis. Concerning short-term effects, we do not see a pattern of reduced volatility at the time of knowing the future date of RCEP's entry into force in the beginning of November 2021 or after RCEP's entry into force itself. Thus, we cannot identify a specific effect that is highly indicative of a large RCEP impact on these country indices, even though RCEP is likely to be a contributing factor for the overall pattern of reduced volatility of the financial market indices.

Figures C8 and C9 in Appendix C add to this by illustrating how large the impact of a shock on the stock market can be. The diagrams depict the returns (left axis) and the volatility (right axis) time series of the country indices as well as the MSCI World index, respectively. The time span reaches from 2018 to mid-2023, thus including the time of the COVID-19 pandemic. The drastic fall of returns and extreme rise of volatility in early 2020 combined with their recovery shortly afterwards support the mentioned theory by Officer (1973) and Schwert (1989a, 1989b).

On industry-level, cumulative returns of the automotive industry clearly show a short-term change of pattern in favour of rising returns, in particular once RCEP became effective for most of its member states in the beginning of January 2022. This indicates that investors recognise the impact of RCEP on this industry. In terms of volatility, while over time we see an overall decreasing volatility, especially for Chinese SAIC motor, there is no distinctive short-term effect around our two points of interest. Concerning the electronic industry we observe a tendency of positive returns of most companies' stocks during the periods of interest, potentially being based in parts on an RCEP effect. Compared with the automotive industry, however, the pattern is weak. Moreover, we can observe a pattern of reducing volatility especially for Sony, Hitachi and Xiaomi at the time when RCEP's imminent entry into force was known in late 2021. Nevertheless, taking together volatility and returns, we cannot clearly identify a distinctive RCEP effect. The chemical sector clearly shows a change of pattern with rising returns specifically around the two points of interest and the development of the companies' stock returns is much more similar after RCEP's entry into force. The results show a decline in volatility that match the short-term rise in returns in late 2021, supporting our observation of a potential RCEP effect. The developments around our second point of interest at the beginning of 2022, however, are not conclusive. Compared with the automotive industry, we see a higher

variability in the comparison of company stocks and reference ETF over the entire period for the other two industries.

Analogously to Figure C8, Figures C10, C11 as well as C12 in Appendix C put the industry-level analysis regarding returns and volatility into perspective by illustrating these metrics over the time span 2018 to mid-2023. Any effect we identified at the time of knowing RCEP's imminent entry into force as well as the entry into force itself are much less visible, if visible at all, as the impact of the COVID-19 pandemic on the stock market is much larger. Some Chinese companies exhibit differing developments in this regard, speaking of differences in policies and economic effects of the the COVID-19 pandemic in China compared with the other countries. These illustrations are equally in support of the mentioned theory regarding stock market reactions to shocks.

Consequently, although we see patterns of rising returns at the points of interest in particular for the automotive and chemical industries, our results are not conclusive of reduced volatility and thus risk of the automotive as well as electronic industries as well as the six main country indices. Concerning the chemical industry, however, the results indicate a pattern of reduced volatility and rising returns in favour of an RCEP effect that reduces the associated risk. Moreover, the RCEP agreement and its provisions are likely to be a contributing factor for an overall reducing volatility over the past years as well as for short-term rises in stock market returns.

5 Conclusion, limitations and research outlook

This chapter provides an overview of the key findings and contributions of this dissertation including a critical assessment of the limitations of the approach presented and followed by insights into potential areas for future research.

The analysis of offshoring in Chapter 2 conducted a theoretical analysis of sourcing strategies based on the renowned model by Antràs and Helpman (2004) and combined it with empirical facts from literature as well as findings from international trade data. With this specific combination and perspective, this dissertation contributes to literature in illustrating how important international trade of intermediate goods and, specifically, services is in world trade, in both manufacturing and service industries, how this has changed over time and what we can learn from it.

We learn that the sourcing strategy model of North and South remains relevant given its ability to capture key dynamics of today's global trade landscape. Nevertheless, the world has changed tremendously and although the simplified two-country framework provides valuable insights into the role of factors such as companies' productivity, incomplete contracts, incentives and bargaining power in an otherwise immensely complex environment, it is crucial to contextualise and critically evaluate the propositions put forth by the model.

One important aspect of the present world economy is that there are no longer developed and developing countries but we see a differentiated picture of countries at every development stage, combined with the empirical fact that relatively less developed countries are generally evolving and improving. This nexus translates to offshoring and in several key aspects the world economy we see today is different from the past, yielding implications for politics and practice. This becomes apparent based on the advancement of TiVA data allowing us to see the interconnectedness of production as well as where value is created and how it is traded.

The geographical distribution of offshoring is primarily influenced by the impact of distance and trade costs on vertical trade. This connection highlights the interplay between trade, investment, and services, prompting MNEs to engage in global sourcing and sometimes establish foreign affiliates, most often in countries that are geographically close.

Notably, the prevailing pattern of offshoring reveals that it primarily occurs between relatively highly developed countries within the regions North America, Europe, and East Asia. As a result, the traditional notion of offshoring, characterised by industrialised economies sourcing intermediate inputs from developing nations, does not accurately reflect

the present landscape of international trade. While relatively less developed economies still face limited access to the world economy, a significant portion of their international trade occurs within their closest network of GVCs. Consequently, the world economy remains regionally segregated for a substantial share of offshoring, influenced by factors such as the opportunity cost of time and unit labour costs, which contribute to the expected persistence of this trend in the future. The key recommendations for policy-makers based on these findings are as follows.

Improving institutional quality: Potential recipient countries of offshored activities should focus on enhancing the quality of their institutions. This includes reducing corruption and improving their legal systems. By doing so, they can attract FDI from MNEs and upgrade their economies. This is particularly important for relatively less developed countries looking to move up the value-added chain through service offshoring and looking to increase their participation in GVCs.

Investing in education: Countries can benefit from investing in their education systems. Enhancing education positively impacts labour productivity, leading to lower unit labour costs and attracting investment. It also enables countries to meet the increasing demand for highly skilled employees in service offshoring activities, resulting in higher wages and improved competitiveness.

Developing policies that address income losses: Especially for the host country of offshored activities, policy-makers need to implement measures that compensate employees for income losses due to structural unemployment resulting from offshoring of activities. This is especially relevant in the context of lower post-displacement wages, particularly in service-related activities. By addressing the negative short-term effects, policy-makers can ensure that overall welfare gains offset these concerns.

Preparing the labour market for a changing workforce composition: As service offshoring increases the demand for highly skilled workers, policy-makers should implement policies that prepare the labour market for a changing workforce. This may involve investing in training and education programs to upskill workers and ensure they are equipped for the evolving job market.

Conducting further research: More research is needed to gain a deeper understanding of the precise effects of service offshoring on labour markets. This will help policy-makers develop targeted policies and interventions that address any potential challenges or negative

consequences while maximising the benefits of service offshoring.

In addition, beyond the scope of service offshoring and offshoring in general, it is important for research to support policy-makers in staying at the forefront of measurement tools allowing for accurate and reliable assessment of various trade-related metrics, identifying trends and patterns in international trade as well as forecasting future trends and potential risks. This then enables formulating trade policies that are well-targeted and effective, which encompasses geopolitical interventions targeted at supporting and preserving employment, national security and stability of supply chains. These, however, are not well designed in the current economic and trade policy environment and therefore risk to significantly harm the world economy (Petri and Plummer, 2023). Consequently, continuous research in this regard is of great importance.

Further recommendations for research arise from this dissertation's limitations. As the analysis limits itself to an analysis on country- and sector-level, further research should encompass the company-level, although it needs to be acknowledged that there is already an extensive body of literature in this regard. Nevertheless, with the specific combination of the sourcing strategy model as the theoretical foundation together with empirical facts from literature as well as the discussed findings from international trade data presented in this dissertation, an analysis on companies' offshoring practices can add to this and yield valuable findings and implications. This is particularly relevant with regard to MNEs, as they account for a substantial share of international trade and offshoring.

Concerning the offshoring analysis, this dissertation is also limited in the sense that it examines indicators for several countries, industries and over time, however, does not go into as much detail as to analyse certain countries or industries with their individual characteristics. Therefore, a focussed approach on a single country or industry is recommended depending on the research question at hand. This in turn supports an enhanced understanding of the overall picture of world trade.

Such a detailed approach on country- and sector-level was part of the subsequent analyses of Chapters 3 and 4 in the context of RCEP. Summarising the main findings of the analysis in Chapter 3, RCEP member states are set to become an even more important trading partner for Germany, the RCEP agreement being a multiplying factor of this development. While the caused effects are complex and ambiguous, this dissertation shows that, overall, Germany will increase its imports from the RCEP zone, thereby becoming

more dependent on that region for key imports and at the same time faces reduced exports. As a consequence, Germany's already substantial trade deficit with RCEP will rise. Despite positive effects such as reduced import prices, we find dominating trade diversion effects for Germany, which is in line with findings of e.g. Park et al. (2021).

The main findings and recommendations on the industries affected most are as follows. Germany faces increasing dependence for its largest import industry of computer, electronic and optical products, calling for a long-term diversified sourcing strategy to mitigate negative effects and decrease vulnerability to, for instance, supply shortages as experienced in the wake of the COVID-19 pandemic. Developing its fellow EU members as an import market in this industry, which already constitute a large export market in this context, seems a viable option. Moreover, the findings call for investments into RCEP states particularly in the two sectors of computer, electronic and optical products as well as motor vehicles, trailers and semi-trailers. This enables German companies and subsidiaries to benefit from positive local RCEP effects, secure key inputs in the former industry as well as preserve and develop the latter industry as an export market. Key factors that policy-makers ought to consider for the design of specific policies were highlighted in Chapter 2 in the context of FDI. The automotive industry is set to face a disruption of GVCs as the large markets of China, Japan and South Korea have metaphorically opened their doors with RCEP, in large parts due to harmonised rules of origin, while the majority of trade expansion will occur in the form of intra-RCEP trade, which is estimated to increase by $465 bn by 2030 due to RCEP. This causes Germany to face increased competition from local manufacturers. Today BMW sells every third car in China while similarly Mercedes-Benz makes 18 percent of revenue in China and 30 percent in Asia. This is exemplary for the need to preserve RCEP markets and manage dependence, which of all RCEP economies for the analysed industries is most important regarding China. Therefore, Germany should make reinforcing existing ties with China as well as creating new ones a top priority of its foreign politics. Several aspects are in support of this, such as increased local military spending and the region's vital importance for sea routes of the global economy. Furthermore, the RCEP region is going to rise in terms of GDP and workforce relative to the rest of the world. The analysis has shown the significance of the regional FTAs RCEP and CPTPP, likely making them the most significant policy actions of recent years in favour of free trade. Given that their positive effects unfold mainly across Asia, this contributes to the economic centre of gravity moving towards this region. These aspects make a more China-centric political agenda necessary for Germany and

local investment into RCEP member states ought to be supported while at the same time managing increasing dependence on key inputs.

These findings are limited in three ways, translating into recommendations for further research. Firstly, the analysis would be improved by making use of a CGE model analysis, the workhorse tool for analysing the impact of policy interactions such as FTAs. This would yield specific figures for the expected changes in trade volume. Secondly, this in turn is of interest for more sectors and other countries than the ones analysed in this dissertation in order to inform policy and public for their decision-making, especially in order to mitigate trade diversion effects and enable partaking in local RCEP benefits. Thirdly, the analysis ought to be enhanced by including detailed analyses on other economic variables than trade, such as the discussed income and labour market effects but also others like price levels, household consumption or energy and environmental variables. Additionally, examining how analyses of past FTAs and their impact on the German economy have been conducted empirically and incorporating learnings into the forthcoming analyses is recommended. Subsequently, this ought to be discussed with politicians, also with view to the EU as some trade policies affecting Germany are designed and decided on EU-level, such as the CAI agreed in principle between the EU and China in 2020.

The subsequent financial market analysis examined the largest financial markets in the RCEP zone in terms of volatility and risk using various GARCH models. The event analysis studied the impact of the RCEP agreement on the financial market indices as well as the three most affected sectors.

The central assumptions were derived from literature and based on Officer (1973), who points out that the volatility of macroeconomic factors correlates strongly with stock market volatility, and based on Schwert (1989a) who argues that in times of recessions many aggregate economic factors, especially financial asset returns and measures of real economic activity, are more volatile. Furthermore, as discussed, stock market volatility does not show long-term effects from shocks and prices of speculative assets should react quickly to new information about economic events. Therefore, combined with RCEP's positive economic effects on the region attracting investment and fostering economic growth, the hypotheses of reducing stock market volatility and increasing stock returns were derived. The event analysis included the time of knowing the future date of RCEP's entry into force as of 60 days earlier as well as the time of its entry into force itself.

The analysis finds that although we see patterns of rising returns at the points of interest, the results are not conclusive of reduced volatility and thus risk due to RCEP regarding the automotive and the electronic industries as well as regarding the six main country indices. However, in respect of the chemical industry, the results indicate a pattern of reduced volatility and rising returns that speak in favour of an RCEP effect which reduces the associated risk. Moreover, the RCEP agreement and its provisions are likely to be a contributing factor for an overall reducing volatility over the past years as well as for short-term rises in stock market returns. It will be interesting to see how RCEP is able so strengthen the region economically and in how far this will reflect on the financial markets in the future.

The financial market analysis is limited in the following aspects, calling for further research. Notably, there are many influences on financial markets affecting the level and the development of company stocks, ETFs and indices. In this study, we focus solely on the effect of the RCEP agreement and do not explicitly incorporate other influences into the analysis. Hence, the ability for causal interpretations is limited. Further research is recommended in this regard, thus broadening the analysis of RCEP's impact on the financial markets of its members by explicitly including other factors and conducting a causality analysis that extents beyond this dissertation's event analysis. This can help us understand the relationships between various variables and their impact on market movements. Several methods can be used to perform causality analysis in the context of financial markets, including for instance the Granger causality test that is used to determine whether one time series can predict another and to establish the direction of causality between two variables by evaluating whether the past values of one variable can improve the prediction of another variable. Moreover, the analysis of sectors can be enhanced by considering more companies, thereby increasing the representativeness and this can be done for additional sectors. Furthermore, with more time passed after the RCEP agreement came into effect, the analysis ought to be repeated in the future to examine whether RCEP will have reduced the volatility of the local financial markets, which would yield valuable insights and implications for policy-making.

Appendices

Appendix A: Country groups

The world divided into five regions (OECD, 2021):

Europe: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, UK, Bulgaria, Cyprus[15], Croatia, Malta, Romania, Russia.

East and Southeastern Asia: Japan, South Korea, Brunei, China, Hong Kong, Indonesia, Cambodia, Lao, Malaysia, Myanmar, Philippines, Singapore, Thailand, Taiwan, Vietnam.

North America: Canada, Mexico, USA.

South and Central America: Chile, Argentina, Brazil, Colombia, Costa Rica, Peru.

Other regions: Australia, Israel, New Zealand, Turkey, India, Kazakhstan, Morocco, Saudi Arabia, Tunisia, South Africa, Rest of the World.

EU27 member states:

Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden (EU, 2023).

OECD member states:

Australia, Austria, Belgium, Canada, Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, South Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, UK, USA (OECD, 2021).

[15]The Republic of Cyprus is recognised by all members of the UN, except for Turkey. The information provided in this document specifically pertains to the area under the effective control of the Government of the Republic of Cyprus.

Appendix B: Details on RCEP and its effect

Table B1: Overview of key RCEP features by chapter (Ch. 1-10)

Ch.	Title	Content
1	**Initial Provisions and General Definitions**	Sets out the agreement's objectives and definitions.
2	**Trade in Goods**	This chapter has the largest impact since it concerns the majority of trade and brings about the largest changes. It will eliminate 90 percent of tariffs on goods over 20 years. For this process, each RCEP member has its own schedule of tariff commitments. Generally, each RCEP member ought to grant national treatment to the goods of another member. This is in accordance with Article three of the GATT from 1994. Provisions on non-tariff measures include a general elimination of quantitative restrictions, improved transparency regarding the application of non-tariff provisions and the administration of import licensing procedures.
3	**Rules of Origin**	Prescribes the rules for determining the originating status of a good making it eligible for preferential tariff treatment. This includes the necessary certification procedures to apply for the RCEP proof of origin that verifies a good's originating status.
4	**Customs Procedures and Trade Facilitation**	Simplifies customs procedures and harmonises them with international standards. While the application procedures are made more transparent and efficient, this chapter defines the expectation that goods ought to be released from customs control within six hours and customs clearance should be made within 48 hours of the arrival of the good. The RCEP members have differing periods to implement these commitments depending on the difficulty of the respective provision's implementation as well as each country's level of development.
5	**Sanitary and Phytosanitary Measures**	Contains measures to protect human, animal or plant life or health and facilitate trade by minimising negative effects of such measures on trade. Reaffirms commitments made in the respective agreement in the WTO.
6	**Standards, Technical Regulations, and Conformity Assessment Procedures**	Aims at enhancing mutual understanding of each country's standards, technical regulations and conformity assessment procedures as well as improving cooperation thereof. Thereby, for instance, unnecessary technical barriers to trade can be reduced. Reaffirms commitments made in the respective agreement in the WTO.
7	**Trade Remedies**	Provides parties with a mechanism in case of damage done to an industry or the threat thereof and includes motivation on cooperating on anti-dumping and countervailing duties. Reaffirms commitments made in the respective agreement in the WTO.
8	**Trade in Services**	Has a strong focus on financial, telecommunications and professional services. Measures include rules on market access, national treatment, MFN treatment and local presence. Analogous to RCEP's Chapter 2, these are subject to individual schedules of tariff commitments. Prescribes member states to use a negative list approach to service trade commitments.
9	**Temporary Movement of Natural Persons**	Defines conditions and limitations for the temporary entry and stay of natural persons related to trade or investment.
10	**Investment**	Defines measures on protection, liberalisation, promotion and facilitation of investments, which includes MFN treatment as well as the negative list approach. Provisions include remuneration on case of expropriation and assistance in resolving complaints. Measures on investor-state-dispute settlement are not integrated yet and are made part of a work program starting up to two years after entry into force of RCEP. Resulting provisions will be activated only if all parties agree.

Source: Author's illustration based on RCEP, 2022a

Table B2: Overview of key RCEP features by chapter (Ch. 11-20)

Ch.	Title	Content
11	**Intellectual Property**	Harmonises standard measures of intellectual property rights and includes provisions on technology and the digital environment, such as cinematographic work, trademarks including geographical indications, industrial designs as well as the protection of plant varieties.
12	**Electronic Commerce**	Comprises measures encouraging to enhance trade administration using electronic means. This chapter contains personal data protection commitments for users and consumers of e-commerce, addresses cross-border transfer of data and includes a moratorium on customs duties on electronic transmissions.
13	**Competition**	Stipulates commitments on competition laws as well as their implementation and enforcement while respecting each member's sovereignty as to define their own competition laws and their enforcement. This chapter includes measures on consumer protection.
14	**Small and Medium Enterprises**	Obliges member states to develop and maintain an information platform specifically for SMEs regarding relevant information resulting from the RCEP agreement.
15	**Economic and Technical Cooperation**	Aims at narrowing development gaps among the members by maximising mutual benefits as well as effectively and efficiently enforcing the RCEP agreement through economic and technical cooperation. This includes technical assistance for those members that are less developed.
16	**Government Procurement**	Prescribes members to publish information on government procurement and related laws in order to improve transparency and promote cooperation among members.
17	**General Provisions and Exceptions**	Stipulates provisions and exceptions applying to the entire RCEP agreement, for instance, regarding transparency on laws and regulations, protection of confidential information as well as preventing and combatting corruption.
18	**Institutional Provisions**	Defines the modus operandi of the RCEP institutional bodies such as the RCEP Ministers and several committees.
19	**Dispute Settlement**	Prescribes detailed provisions governing dispute settlements with rules and procedures. Recognises special requirements for the treatment of least-developed country members in this regard.
20	**Final Provisions**	Addresses the relationship between RCEP and other FTAs and defines procedures for amendments of the agreement as well as its entry into force and potential accessions of other parties.

Source: Author's illustration based on RCEP, 2022a

Table B3: Comparison of results: effects of RCEP and CPTPP on trade and income (detailed results)[16]

	FTA	Launch date for estim-ation	Tariff Liberali-zation	Preferential NTBs reductions	MFN NTBs reductions	Real income effects in 2030 (% changes)				Exports effects in 2030 (% changes)			
						CPTPP members	RCEP members	China	World	CPTPP members	RCEP members	China	World
Park, Petri and Plummer (2021)	**RCEP**	2020	90% eliminated	Average of recent ASEAN+1 agreement	10%		**0.56**	**0.46**	**0.20**		**4.9**	**4.7**	**1.4**
	CPTPP	2018	As negotiated for TPP agreement	As negotiated for TPP agreement expect for suspended provisions	10%		**0.26**	**0.05**	**0.14**		**2.1**	**0.1**	**0.9**
Petri and Plummer (2020)	**RCEP**	2020	90% eliminated	ASEAN reductions	10%		**0.43**	**0.36**	**0.16**		**4.92**	**4.90**	**1.39**
	CPTPP	2018	As negotiated for TPP agreement	As negotiated for TPP agreement	10%		**0.16**	**0.10**	**0.09**		**1.93**	**0.18**	**0.79**
Ferrantino, Maliszewska and Taran (2020)	**RCEP***	2018	Petri and Plummer (2016) and ITC (2016)	Petri and Plummer (2016) and ITC (2016)	Petri and Plummer (2016) and ITC (2016)	**1.96*** **	2.1 **4.5** (incl. product-ivity kick)	**2.07*** **	**0.62*** **		4.9 **7.8** (incl. product-ivity kick)	4.2 **8.0** (incl. product-ivity kick)	1.4 **2.6** (incl. product-ivity kick)
	CPTPP	2018	As negotiated for TPP agreement	Petri and Plummer (2016)	Petri and Plummer (2016)	0.9 **1.4** (incl. product-ivity kick)	**0.32*** **	**-0.02*** **	**0.11*** **	2.8 **3.4** (incl. product-ivity kick)		-0.1 0.0 (incl. product-ivity kick)	0.3 **0.4** (incl. product-ivity kick)
Estrades, Maliszewska, Osorio-Rodarte, Pereira and Filipa (2022)	**RCEP**	2021	As negotiated for RCEP agreement	25 35%	10%	0.34 (incl. rules of origin) **0.55** (incl. product-ivity kick)	0.41** (incl. rules of origin) **1.75**** (incl. product-ivity kick)	0.27 (incl. rules of origin) **2.31** (incl. product-ivity kick)	0.11 (incl. rules of origin) **0.52** (incl. product-ivity kick)		3.7 (incl. rules of origin) **5.2** (incl. product-ivity kick) ****	2.4 (incl. rules of origin) **4.0** (incl. product-ivity kick) ****	
Itakura (2022)	**RCEP**	2022	According to RCEP Annex I (RCEP, 2022c)				0.4 (incl. trade cost liberalization) **0.6** (incl. investment commitments) *****	0.3 (incl. trade cost liberalization) **0.5** (incl. investment commitments) *****	0.1 (incl. trade cost liberalization) **0.0** (incl. investment commitments) *****		3.0 (incl. trade cost liberalization) **4.2** (incl. investment commitments)	3.0 (incl. trade cost liberalization) **3.9** (incl. investment commitments)	0.9 (incl. trade cost liberalization) **0.9** (incl. investment commitments)

Source: Author's elaboration

[16]The scenarios employed include tariff reductions, preferential NTB reductions as well as MFN NTB reductions. The rules of origin scenario follows the assumption of a one percent reduction in trade costs among RCEP members in addition to the other liberalisations. The productivity scenario assumes an increase in productivity in relation to the tariff reduction in addition to the other liberalisations incl. the rules of origin additions (Estrades et al., 2022). The trade cost liberalisation scenario includes a 20 percent reduction of ad valorem tariff equivalents of trade in services over 10 years, while the investment commitments scenario additionally incorporates RCEP's investment provisions (see scenarios S2, S3 and S4 in Itakura, 2022). * includes India ** excludes Brunei and Myanmar *** as reported in Estrades et al. (2022) **** effects estimated for 2035 ***** effect on welfare (households' utility).

Appendix C: Financial market and risk analysis of the RCEP zone

Table C1: GARCH(1,1) Coefficients from the GARCH model - country indices

	μ	ω	α_1	β_1
SSE	1.975335e-04	7.660894e-06	1.196866e-01	8.254659e-01
SD	2.703153e-04***	6.315498e-07***	1.222261e-02*	1.509137e-02*
Nikkei	6.359045e-04	1.323395e-05	1.342873e-01	7.747692e-01
SD	2.898387e-04***	5.136751e-07***	1.449923e-02*	1.823236e-02*
KS11	3.251292e-04	8.084509e-06	1.459739e-01	7.880712e-01
SD	2.561318e-04***	7.107093e-07***	1.633788e-02*	1.839772e-02*
AX30	3.467828e-04	4.321557e-06	1.494232e-01	8.031107e-01
SD	1.959252e-04***	1.314767e-06***	1.822688e-02*	1.394859e-02*
JKSE	2.285863e-04	6.779299e-06	1.283316e-01	7.980171e-01
SD	2.249588e-04***	4.831086e-07***	1.264494e-02*	1.608565e-02*
SET	-6.918421e-05	2.449884e-06	9.898301e-02	8.722037e-01
SD	2.040584e-04***	1.496963e-06***	1.493174e-02*	1.694263e-02*
MSCI W.	7.231845e-04	4.628321e-06	1.861070e-01	7.873699e-01
SD	2.225469e-04***	4.124110e-06***	2.617211e-02*	3.602901e-02*

Source: Author's calculation

Table C2: GARCH(1,1) Coefficients from the GARCH model - automotive industry

	μ	ω	α_1	β_1
Toyota	5.364034e-04	1.831338e-05	1.175362e-01	8.037959e-01
SD	3.658298e-04***	6.211024e-06***	2.571753e-02*	4.702096e-02*
SAIC	-2.070899e-04	2.432017e-05	1.456488e-01	7.964493e-01
SD	4.515656e-04***	6.960994e-06***	2.660972e-02*	3.678872e-02*
Honda	2.106299e-04	6.252052e-06	3.876661e-02	9.412998e-01
SD	4.512636e-04***	9.913819e-07***	4.537114e-03**	6.975000e-03**
Hyundai	6.885493e-05	8.097091e-06	6.158213e-02	9.214050e-01
SD	4.872086e-04***	1.832113e-06***	6.477019e-03**	7.842776e-03**
Nissan	-4.488679e-04	4.788880e-06	7.295931e-02	9.204531e-01
SD	4.718779e-04***	4.250764e-06***	2.162889e-02*	2.500319e-02*
Reference ETF	4.447001e-04	1.118877e-05	8.913732e-02	8.739313e-01
SD	4.059992e-04***	8.865779e-07***	7.840081e-03***	1.194692e-02*

Source: Author's calculation

Table C3: GARCH(1,1) Coefficients from the GARCH model - electronic industry

	μ	ω	α_1	β_1
Samsung	3.996784e-04	4.894513e-06	4.118145e-02	9.394991e-01
SD	4.084954e-04***	1.609770e-06***	5.190926e-03**	8.074355e-03**
Sony	1.212738e-03	2.149165e-05	4.082169e-02	9.024663e-01
SD	5.111686e-04***	1.155074e-05***	1.335439e-02*	4.037712e-02*
Hitachi	9.124839e-04	2.388718e-05	7.996834e-02	8.559305e-01
SD	4.828105e-04***	1.648435e-05***	3.287198e-02*	7.435167e-02
Panasonic	0.0004225068	0.0001442550	0.2144618266	0.3866067476
SD	4.771393e-04***	4.527111e-05***	5.067564e-02	1.577640e-01
Xiaomi	-3.124670e-04	1.612339e-05	4.635230e-02	9.352004e-01
SD	7.882787e-04***	6.360159e-06***	2.649123e-03**	8.661211e-03**
Reference ETF	1.317380e-03	8.937518e-06	1.770126e-01	7.977947e-01
SD	3.145013e-04***	4.230331e-06***	4.160286e-03**	1.589298e-02*

Source: Author's calculation

Table C4: GARCH(1,1) Coefficients from the GARCH model - chemical industry

	μ	ω	α_1	β_1
LG Chem.	3.367352e-04	6.669248e-06	3.351383e-02	9.574217e-01
SD	6.509245e-04***	4.351126e-06***	2.294327e-03**	3.592974e-03**
Mitsubishi Chem.	6.928178e-05	6.826598e-05	1.678605e-01	6.095432e-01
SD	4.317602e-04***	1.824739e-05***	3.337635e-02*	7.831816e-02
Hengli Petrochem.	3.265063e-04	1.842525e-05	5.174596e-02	9.203592e-01
SD	6.541748e-04***	7.794466e-06***	1.274899e-02*	2.172971e-02*
Wanhua Chem.	1.942046e-05	2.146098e-11	1.984702e-01	7.966947e-01
SD	3.100090e-06***	5.011370e-07***	1.018811e-02*	7.907474e-03**
Sumitomo Chem.	-4.322788e-04	5.378773e-06	2.708087e-02	9.564347e-01
SD	4.694991e-04***	8.648515e-07***	2.488452e-03**	4.033460e-03**
Reference ETF	5.393420e-04	6.661767e-06	1.041943e-01	8.493465e-01
SD	2.751480e-04***	8.186049e-07***	1.234414e-02*	1.392818e-02*

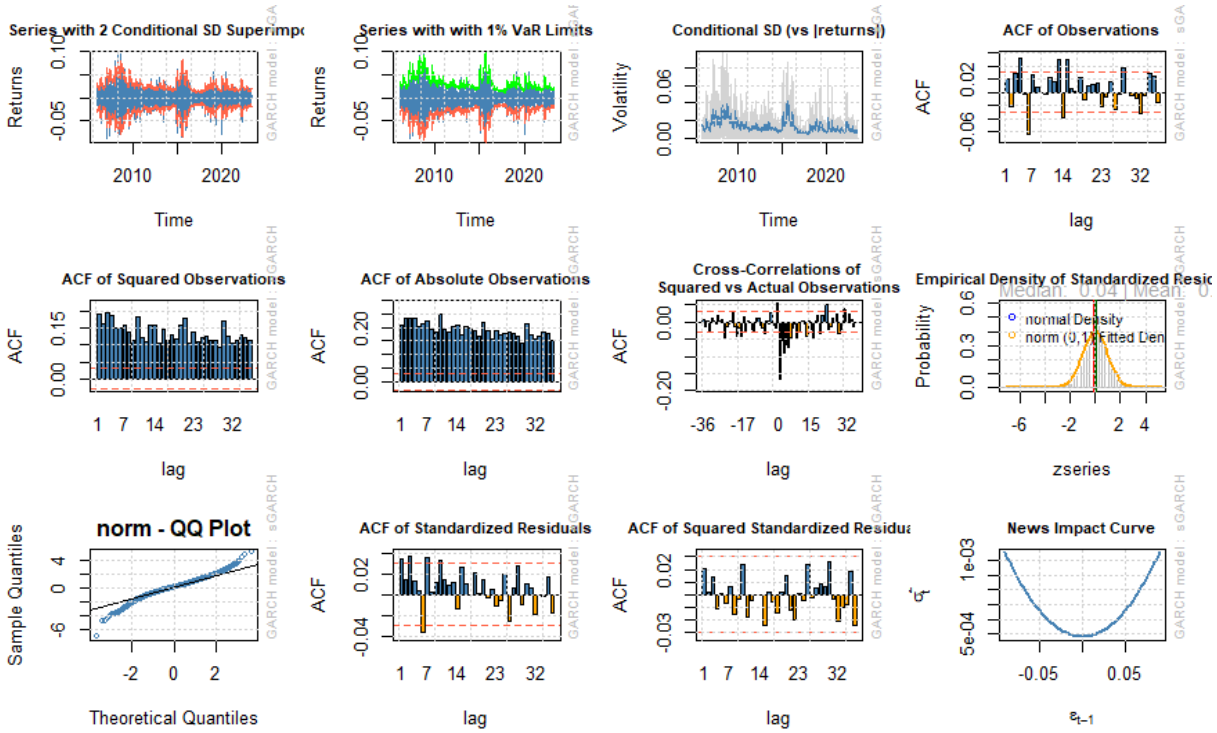
Source: Author's calculation

The subsequent three diagrams depict details on the volatility of the Chinese SSE, the Japanese Nikkei as well as the MSCI World index. The following list provides a description of each plot. For a more detailed description refer to the manual of the R package *rugarch*.

The plots illustrate the following:

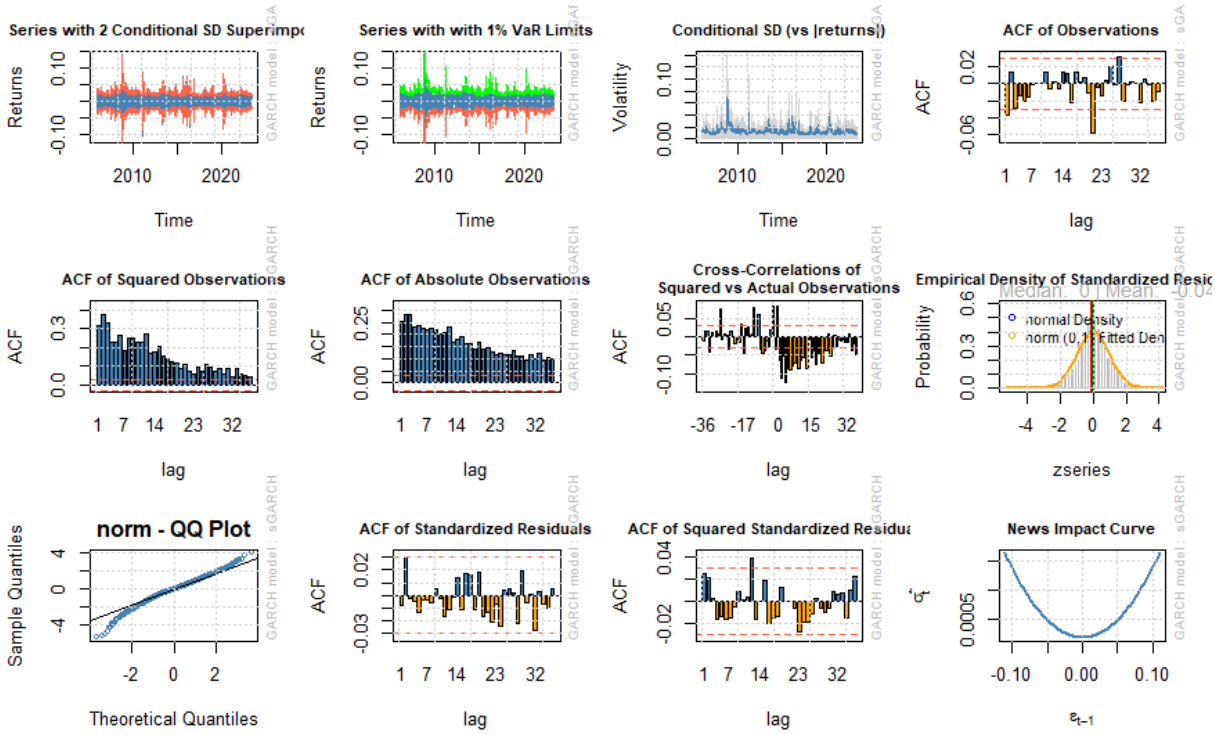
1. Series plot with two conditional standard deviations (SD) superimposed
2. Series plot with Value at Risk (VaR)
3. Conditional SD plot
4. Autocorrelation function (ACF) plot of observations
5. ACF plot of squared observations
6. ACF plot of absolute observations
7. Cross correlation plot between r^2 and r
8. Density of standardised residuals
9. Quantile-quantile (QQ) plot of standardised residuals
10. ACF plot of standardised residuals
11. ACF plot of squared standardised residuals
12. News impact curve

Figure C1: Details on the volatility of the Shanghai Composite index (SSE)



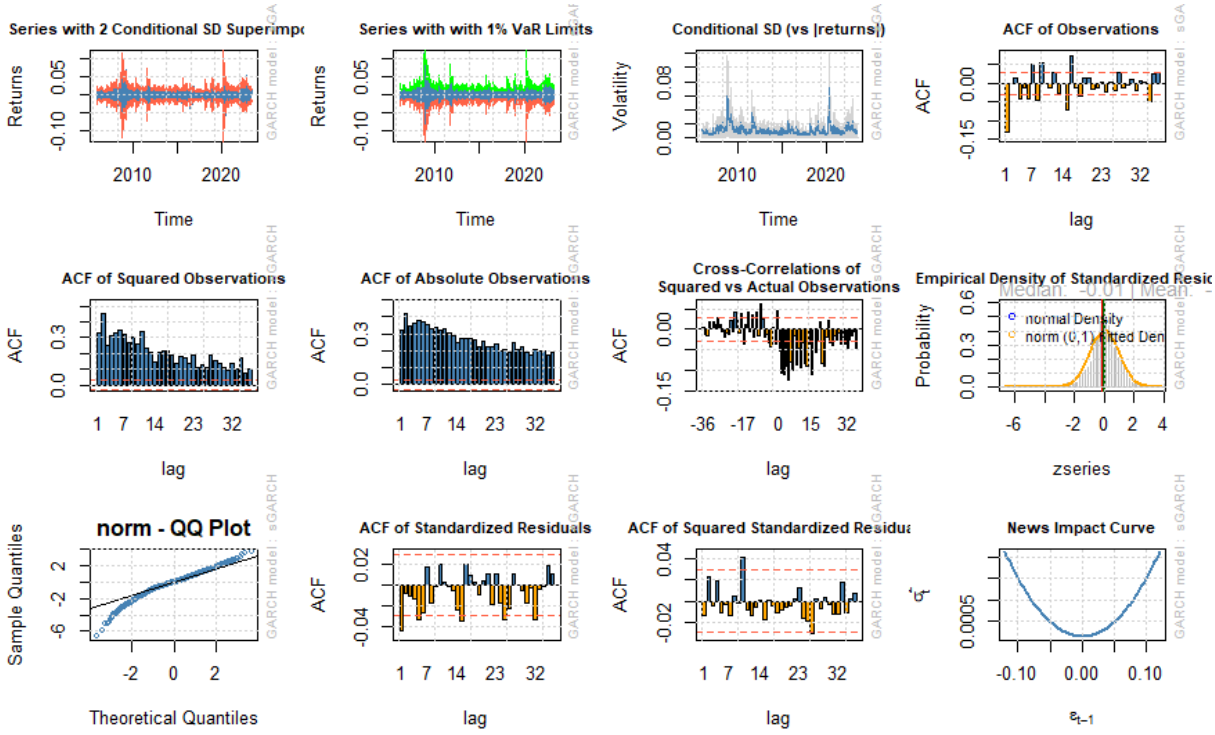
Source: Author's calculation based on Yahoo Finance (2023)

Figure C2: Details on the volatility of the Nikkei index (Nikkei225)



Source: Author's calculation based on Yahoo Finance (2023)

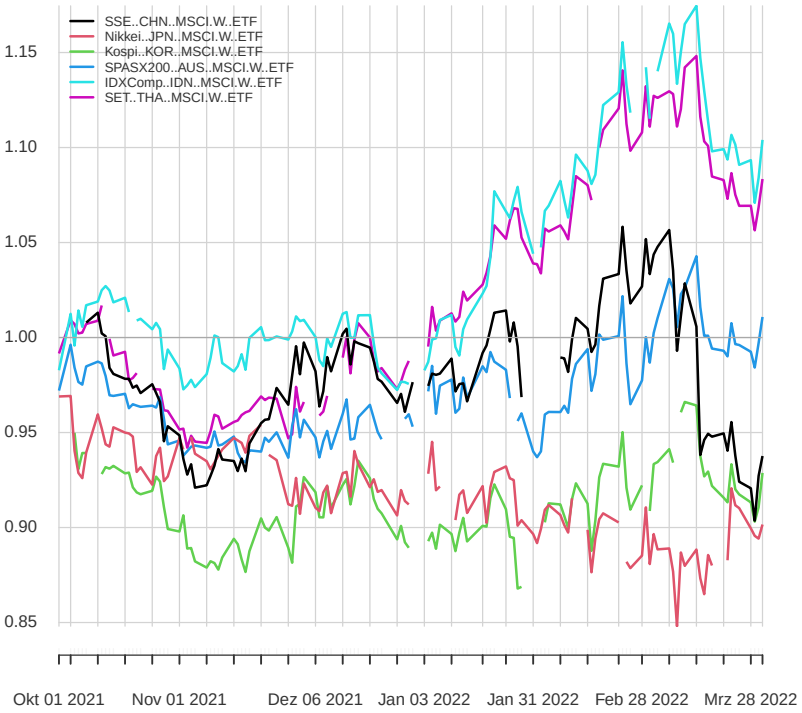
Figure C3: Details on the volatility of the MSCI World index



Source: Author's calculation based on Yahoo Finance (2023)

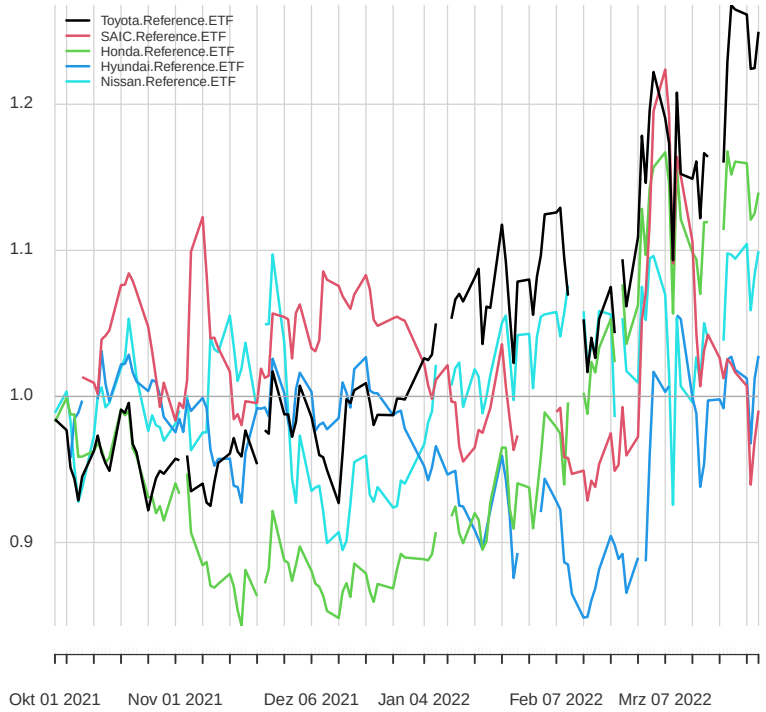
The following Figures C4 to C7 depict the cumulative returns of the country indices and industries' stocks against their references, namely the MSCI World index (regarding Figure C4) and the industries' ETFs (regarding Figures C5 to C7). In each diagram, the baseline of the reference is scaled to 1.00 on the vertical axis. For details refer to the R package PerformanceAnalytics (Carl and Peterson, 2020).

Figure C4: Short-term stock market performance of the major indices against the reference ETF - cumulative returns (10/2021 - 03/2022)



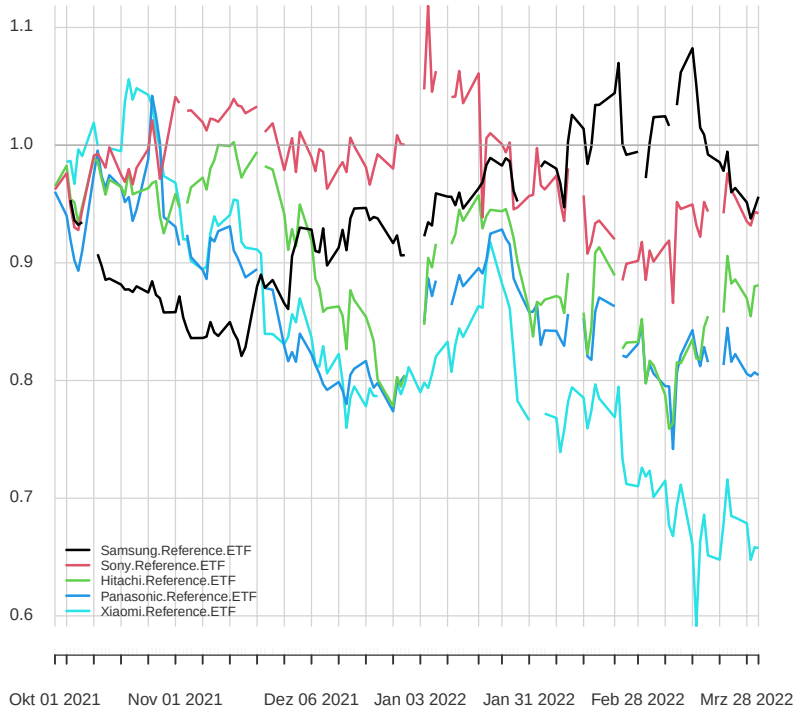
Source: Author's calculation based on Yahoo Finance (2023)

Figure C5: Short-term stock market performance of the automotive industry against the reference ETF - cumulative returns (10/2021 - 03/2022)



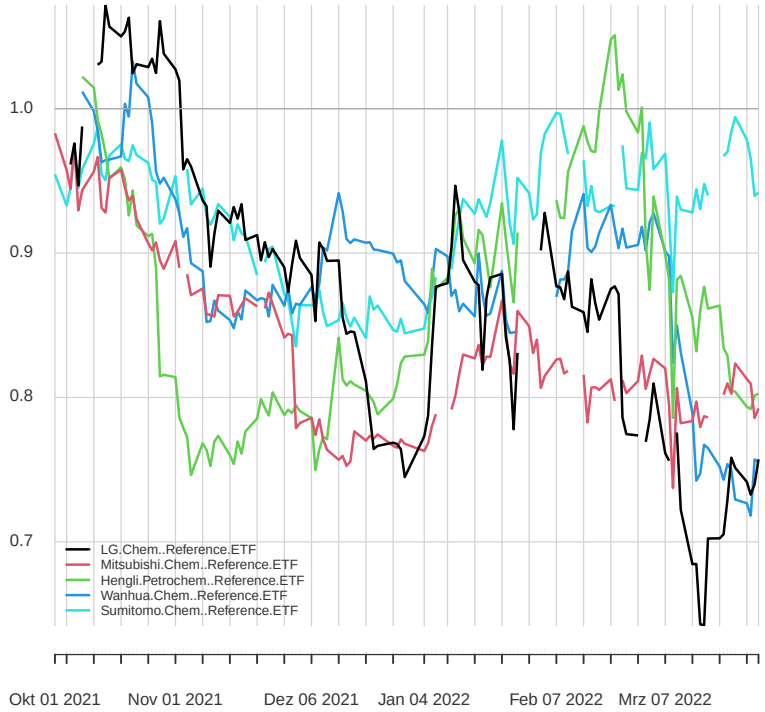
Source: Author's calculation based on Yahoo Finance (2023)

Figure C6: Short-term stock market performance of the electronic industry against the reference ETF - cumulative returns (10/2021 - 03/2022)



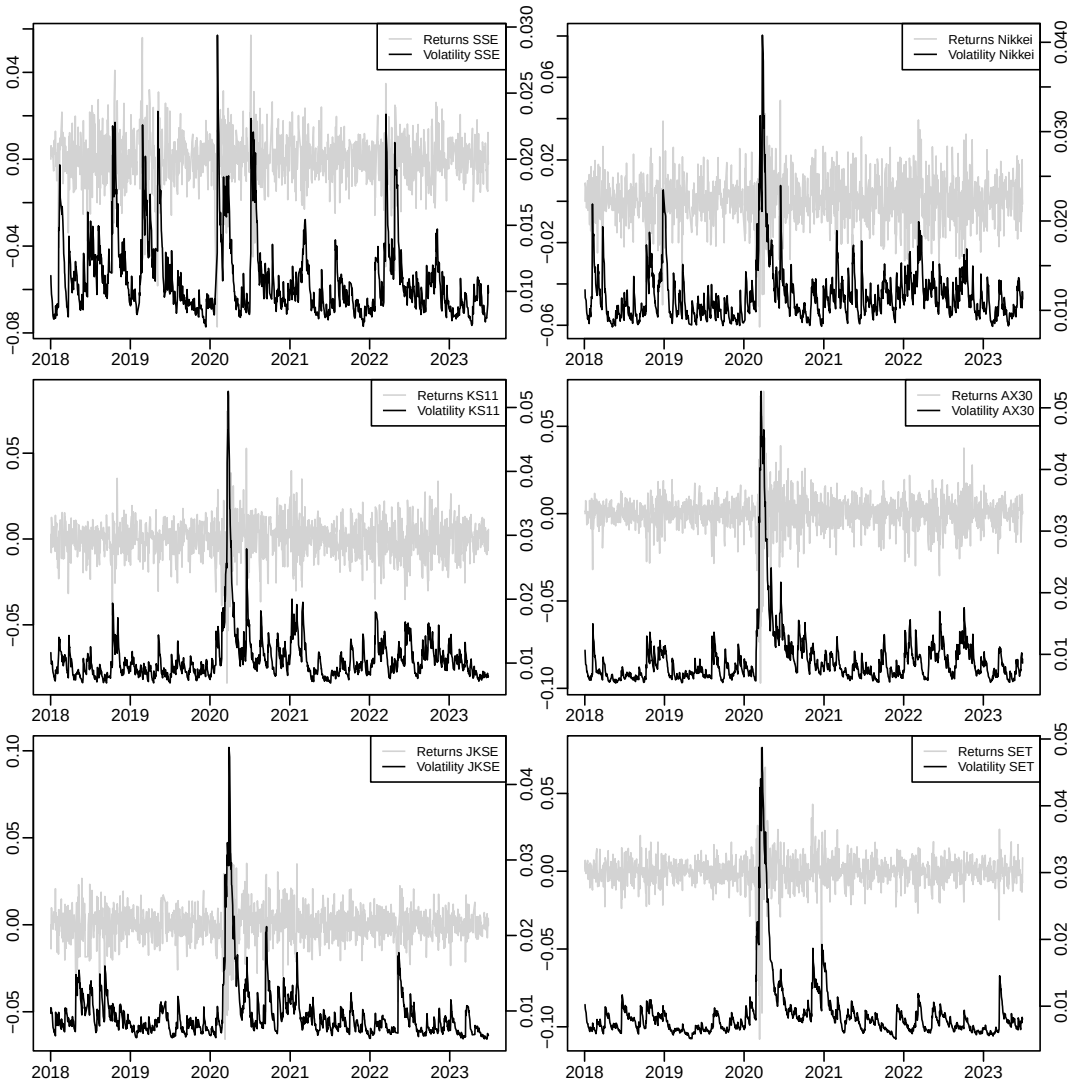
Source: Author's calculation based on Yahoo Finance (2023)

Figure C7: Short-term stock market performance of the chemical industry against the reference ETF - cumulative returns (10/2021 - 03/2022)



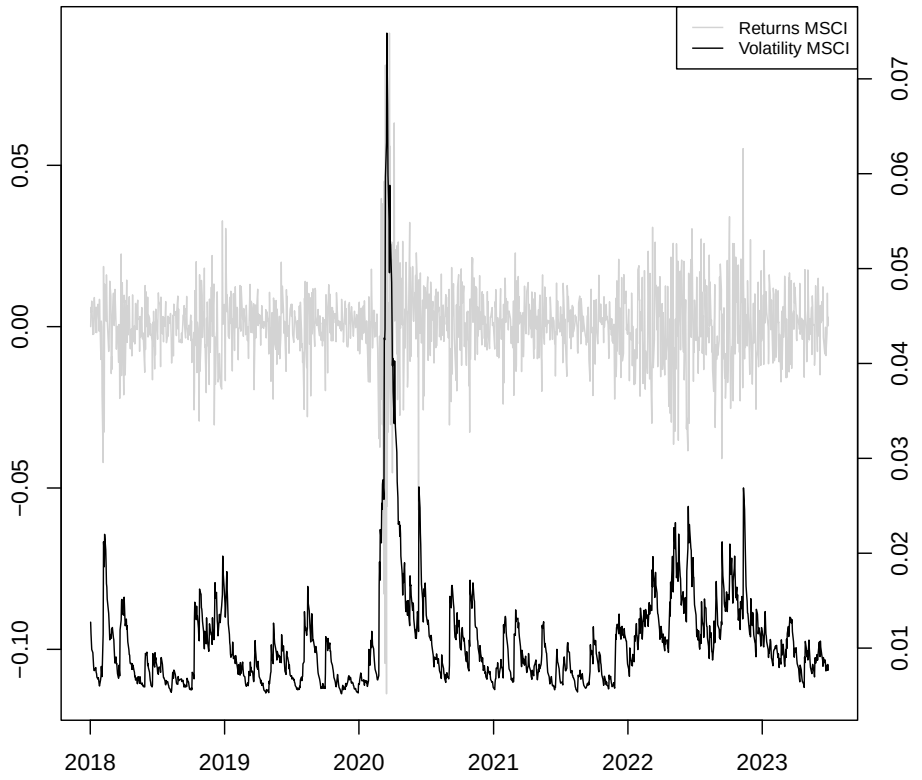
Source: Author's calculation based on Yahoo Finance (2023)

Figure C8: The volatility and returns time series of RCEP's largest financial markets (2018-2023)



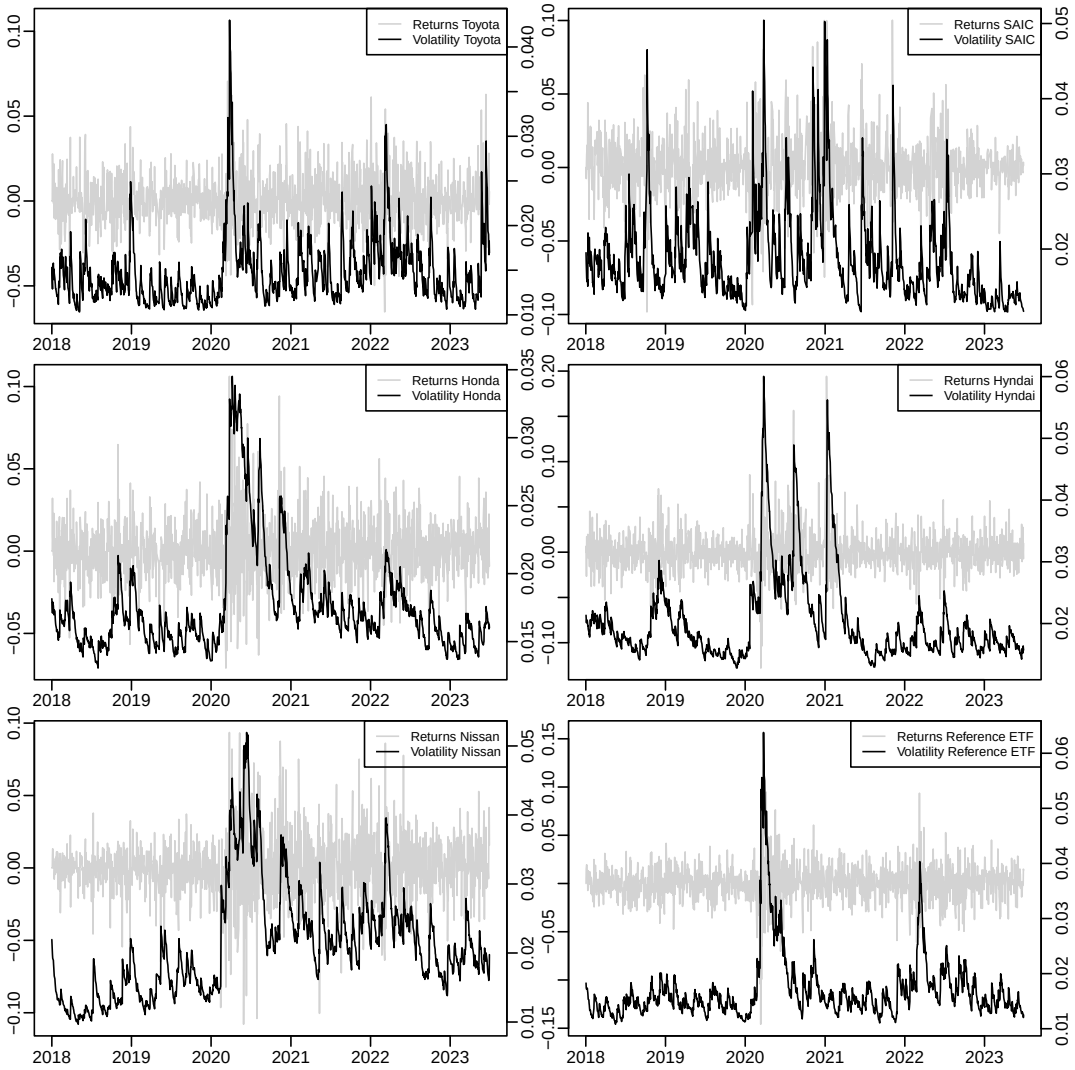
Source: Author's calculation based on Yahoo Finance (2023)

Figure C9: The volatility and returns time series of the MSCI World index (2018-2023)



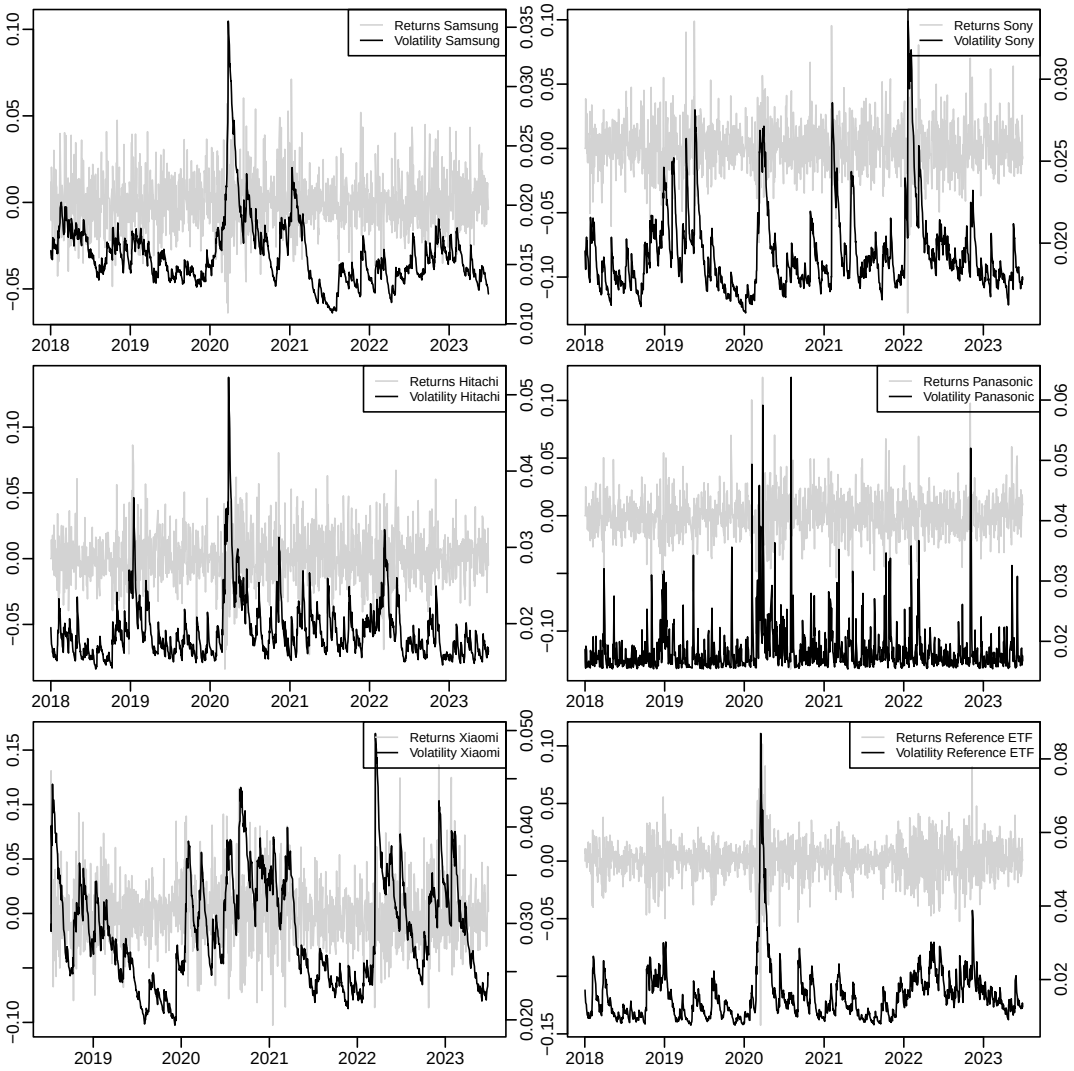
Source: Author's calculation based on Yahoo Finance (2023)

Figure C10: The volatility and returns time series of RCEP's largest automotive companies (2018-2023)



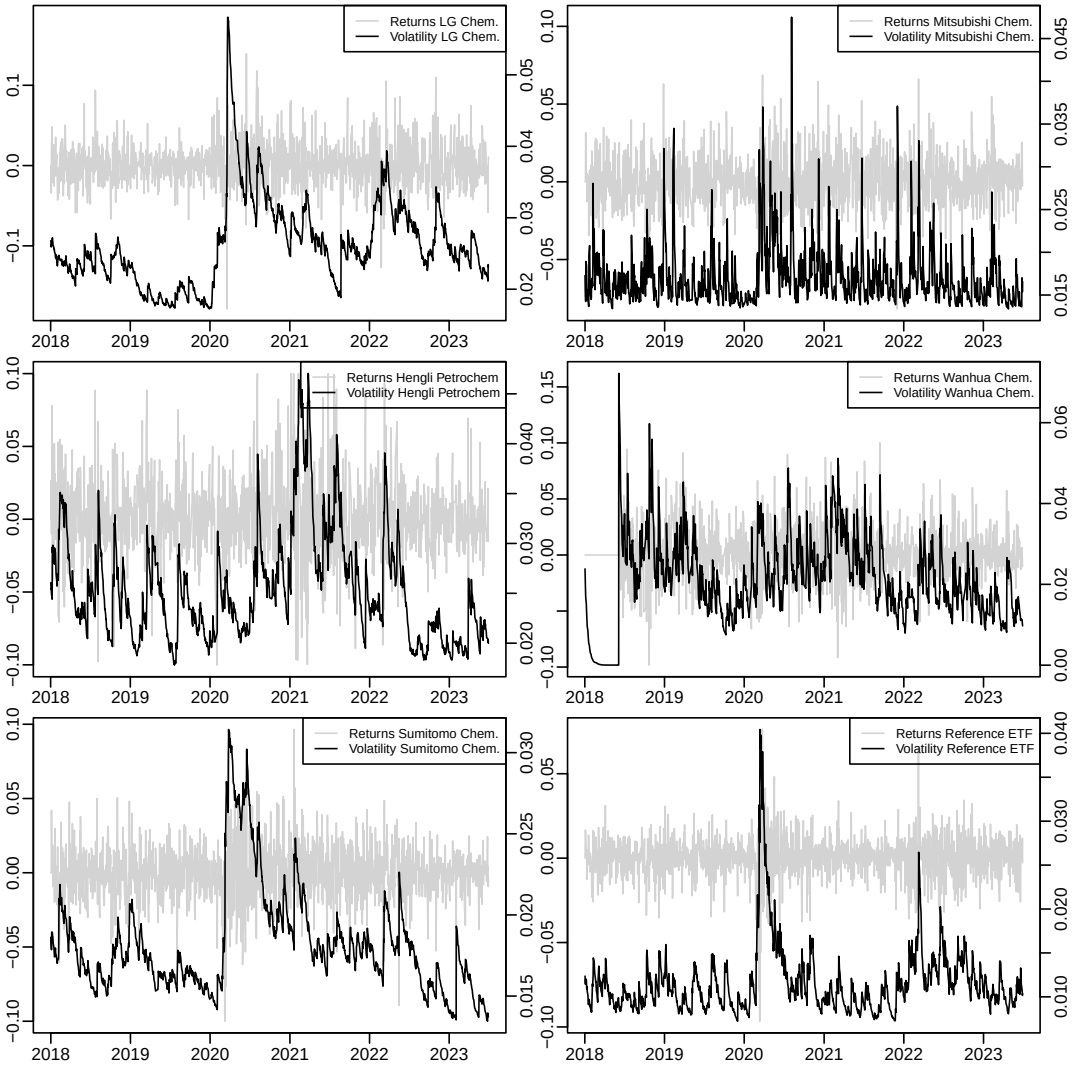
Source: Author's calculation based on Yahoo Finance (2023)

Figure C11: The volatility and returns time series of RCEP's largest electronic companies (2018-2023)



Source: Author's calculation based on Yahoo Finance (2023)

Figure C12: The volatility and returns time series of RCEP's largest chemical companies (2018-2023)



Source: Author's calculation based on Yahoo Finance (2023)

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Declaration of originality

I confirm that this thesis is my own work and that I have not sought or used inadmissible help of third parties to produce this dissertation. I have clearly referenced all sources used. This work has not yet been submitted to another institution, neither in the same nor in a similar way and has not yet been published.

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(Marc Dominic Atkins)