



## TÍTULO

**THE DYNAMICS OS SPAIN'S TRADE NETWORK WITH MAJOR PARTNERS**  
A TEN-YEAR STRUCTURAL REVIEW THROUGH TIVA INDICATORS USING FIGARO DATABASE (2010-2020)

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## **Trabajo de Fin de Máster**

# **MÁSTER EN RELACIONES INTERNACIONALES**

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### **Título:**

The dynamics of Spain's Trade Network with Major Partners:  
A ten-year structural review through TiVA Indicators using  
FIGARO database (2010 – 2020).

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## Abstract

The cross-border flows of goods, investment, services, know-how and people associated with international production networks – call it supply chain trade for short – has transformed the world. This study investigates the structural dynamics of Spain's foreign trade with its major partners through the analysis of the 2010-2020 dataset available in the FIGARO database and the calculation of TiVA indicators. The research unfolds in three distinct phases: (1) consulting secondary sources of information, (2) gathering data from primary sources, and (3) processing and analyzing the data. It sheds light on the intricate interconnections characterizing global trade in the 21st century and Spain's role within global value chains. The primary newness lies in the utilization of the FIGARO database, which the author contends is the most comprehensive and homogeneous source of production data. The key findings underscore the significance of employing Input/Output analysis methodology and TiVA indicators for examining the foreign trade sector. They also highlight the expansion of global value chains (GVC) and offshoring of production, Spain's position within these chains, and the need for a more comprehensive trade policy that encompasses dynamics with other regions and partners.

**Key words:** FIGARO dataset, Trade in Value Added Indicators (TiVA), foreign trade, Input/Output, Global Value Chain (GVC), España.

## Resumen

Los flujos transfronterizos de bienes, capitales, servicios, conocimientos y personas, asociados a las redes internacionales de producción – conocidos como comercio en la cadena de suministro – han transformado el mundo. A través de la serie 2010-20 disponible en la base de datos FIGARO y el cálculo de los indicadores TiVA se hace un análisis estructural de las dinámicas del comercio exterior de España con sus principales socios. La investigación delimitada en tres fases: (1) consulta a fuentes secundarias de información, (2) consulta a fuentes primarias de información y (3) procesamiento y análisis de los datos; arroja luz sobre las interconexiones propias del comercio mundial en el presente siglo y el papel de España dentro de las cadenas globales de valor. Su principal novedad reside en la utilización de la base de datos FIGARO, la cual a juicio del autor es la más completa y homogénea con datos de producción. Las principales conclusiones destacan, el empleo de la metodología de análisis Input/Output y los indicadores TiVA para el estudio del sector exterior, la expansión de las cadenas globales de valor y la producción deslocalizada, la posición de España en estas Cadenas de Valor Mundiales (CVM) y las carencias en cuanto a política comercial de sus dinámicas con otras regiones y socios.

**Palabras clave:** base de datos FIGARO, Indicadores TiVA, comercio exterior, Input/Output análisis, Cadenas de Valor Mundiales (CVM), España.

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## Introduction

“The cross-border flows of goods, investment, services, know-how and people associated with international production networks – call it *supply chain trade* for short – has transformed the world.”

(Baldwin, 2012).

Numerous scholarly investigations posit that the surge in post – war trade was underpinned by substantial technological, communication, and transportation advancements. However, it is noteworthy that these forces are currently experiencing a gradual deceleration. Irwin (2002) elucidates the upswing in trade growth by highlighting a transition from the exchange of primary goods to the proliferation of manufactured goods. This shift was facilitated by pivotal innovations such as containerization and other logistical breakthroughs, which significantly enhanced efficiency within the transportation sector, thereby fortifying global trade (Hummels et al., 2001). Arguably, one of the most crucial factors contributing to this phenomenon was the burgeoning accessibility of emerging markets to international trade, underscored by the remarkable descent in tariff rates.

Concurrent with these developments, technological and economic progress facilitated the global fragmentation of the manufacturing process through the utilization of international supply chains, as elucidated by Amador & Cabral (2014). This proliferation of outsourcing for intermediate production processes contributed to a surge in the trade of intermediate goods. Consequently, the overall volume of trade expanded, even in cases where the consumption of final traded goods remained relatively static. These multifaceted factors collectively contributed to elevating the income elasticity of trade beyond unity during the pre – crisis era. However, it is imperative to acknowledge that several of these catalysts have since waned. Tariff rates have stabilized at lower levels, logistical innovations have matured, and the expansion of global value chains has decelerated, primarily due to escalating labor costs in pivotal emerging markets. The European Central Bank assessment in 2016 suggests that the diminishing support from these factors may, to a significant extent, account for the prolonged decline in trade elasticity, predating even the onset of the Great Recession.

Dicken (2007) contends that the evolving landscape of global economic activities necessitates a nuanced terminology: “globalization”, defined as the “functional integration of internationally dispersed activities”. In today's economic milieu, globalization encompasses traditional drivers of internationalization, such as arms – length trade and intra – enterprise trade

linked to Foreign Direct Investment (FDI). However, it extends beyond these familiar concepts by incorporating external international sourcing, a phenomenon demanding a higher degree of explicit coordination, which distinguishes it from conventional arms – length trade.

This external international sourcing represents a relatively uncharted dimension of trade, standing alongside arms – length and intra – group trade. Remarkably, it appears to be gaining prominence in the global economic arena. In essence, external international sourcing arrangements infuse inter-enterprise trade with characteristics reminiscent of intra – group trade. This entails a more centralized control structure, a heightened flow of bilateral information, the ability to accommodate asset specificity, and a seamless alignment and immediate integration of business processes. These attributes collectively amplify the potential for foreign operations to substitute activities previously performed on home turf.

In summary, Dicken's concept of globalization encapsulates a dynamic shift in the way international economic activities are structured and coordinated. It integrates well – established practices with emerging trends, like external international sourcing, which challenge the traditional boundaries of trade. This paradigm shift has profound implications for how businesses operate and adapt in an increasingly interconnected global marketplace.

One of the evident outcomes of the prevailing globalization is the fragmentation of production processes and the subsequent rise of Global Value Chains (GVCs). In the contemporary landscape, the production of goods and services is intricately woven through multiple phases and dispersed across different countries. This intricate network of international production signifies a departure from traditional manufacturing practices, where various components and stages of production are distributed across diverse global locations. It underscores the interconnectedness of nations in the context of today's globalized economy and highlights the need to understand these evolving dynamics for a comprehensive analysis of international trade.

With the onset of trade liberalization in the 1990s and its heightened momentum in the 2000s, countries have become more interconnected than ever before. Presently, the World Bank (2020) reports that over two – thirds of global trade is attributable GVCs. This transformation underscores the profound impact of international trade dynamics on the contemporary global economic landscape, emphasizing the pivotal role played by GVCs in shaping the flow of goods and services across borders.

Current trade statistics do not fully capture the depth of production process internationalization. While this phenomenon is not novel, it has garnered substantial attention in the past decade. This heightened interest can be attributed to the proliferation of outsourcing and offshoring practices, the concurrent reduction in transportation and communication costs, and the significant enhancements in trade logistics. Collectively, these factors have given rise to a transformation in final consumption patterns, resulting in the broadening of the spectrum of available goods and services (Coeuré et al., 2010).

In essence, this evolution in production processes has reshaped the global market landscape by enriching the diversity of consumer choices. It is imperative to recognize the intricate interplay between production globalization and its impact on consumer behavior to comprehend the contemporary international trade milieu accurately. Understanding these dynamics is paramount for an insightful analysis of the internationalization of production processes and its implications.

An empirical analysis conducted by the European Central Bank in 2016 highlights a structural shift in the relationship between trade and income. Utilizing formal panel structural break tests, this analysis identifies two key structural breakpoints, leading to the delineation of three distinct regimes. The estimated break points are notably situated around 2000, coinciding with the period preceding China's accession to the WTO and its subsequent integration into the global economy. Another breakpoint emerges at the close of 2009, marking the repercussions of the Global Trade Collapse (GTC).

Country – level tests reinforce the notion of substantial variations in the connection between trade and income across these three distinct regimes, with a particularly noteworthy decline in trade elasticity evident in the third regime post – 2009.

Over recent decades, the reduction of trade barriers, coupled with diminishing transportation costs, has fueled the exponential growth GVCs. These complex systems, orchestrating the dispersion of production processes across the global landscape, pose a formidable challenge to conventional national statistical methods (T. Sturgeon, 2015). Global Value Chains have triggered a profound shift in the framework of global production. Their impact reverberates through international trade, investments, labor market dynamics, and the very prism through which policymakers formulate trade strategies and evaluate external competitiveness.



This transformative wave needs a reevaluation of established economic analysis paradigms and policy frameworks to effectively comprehend the intricate interconnections that now define the global economic landscape.

The fundamental driver underpinning the ability of corporations to fragment their production processes resides in the substantial reduction of trade – related costs. This reduction, primarily attributed to technological breakthroughs such as containerization and the pervasive presence of the internet, has led to a paradigm shift. Furthermore, the evolution and refinement of logistics networks have ushered in an era of uninterrupted, coordinated, and cost – efficient flows of goods and services within the global economic landscape.

In addition to these technological advancements, the liberalization of trade markets and strategic regulatory reforms in pivotal sectors like transportation and infrastructure have exerted a profound influence. These policy – driven interventions have not only enhanced operational efficiency but have also played a significant role in elucidating the intricate phenomenon of production fragmentation, synergizing with the advances in transportation and communication technologies (Sturgeon, 2013).

Moreover, it is paramount to recognize the pivotal role of policy frameworks in fostering efficiency and comprehension the production fragmentation, in correspondence with technological and communicative advancements.

Finally, considering the demand side of the equation, the global economy has undergone a radical transformation in recent decades. The ascendancy of Asia, accompanied by the growth rates of emerging economies, has amplified the magnitude of global demand, serving as a potent catalyst for international trade. Consequently, trade in both final goods and services has witnessed remarkable expansion, mirroring the notable growth observed in intermediate goods trade. This multifaceted interplay of factors underscores the profound evolution reshaping the contours of the contemporary global economic landscape.

Innovation has become a driving force behind the emergence of new goods and services, consequently fueling a faster pace of trade expansion. Evidence to this dynamism is that, in 2017, a 65% of trade activities occurred within categories that had no existence back in 1992 (World Bank, 2020). This underscores the transformative impact of innovation and evolving consumer preferences on the global trade landscape.

The advent of the GVCs paradigm requires a broader perspective that transcends conventional industry boundaries, providing a comprehensive understanding of contemporary

trade and production patterns. Current trade dynamics are characterized by a notable trend towards intra-industry trade, reflecting the redistribution of resources following trade liberalization and increased investment. Countries are now gravitating towards specialization in specific business functions, rather than rigid adherence to industries. Remarkably, certain services, such as financial and transportation services, have become integral components of nearly every value chain. Additionally, industries involved in the extraction of raw materials often occupy foundational roles at the inception of virtually every manufacturing – oriented GVC. This structural transformation underscores the intricate and interdependent nature of today's global trade and production networks (Amador & Cabral, 2014).

In the contemporary economic landscape, the likelihood of reverting to a pre-Global Value Chains (GVCs) world appears remote. Conversely, there remains significant room for the expansion and deepening of GVCs, particularly through an augmented focus on the services sector. Additionally, developing nations are increasingly participating in diverse GVC stages, which can play a pivotal role in advancing their economic development. GVCs serve as conduits for the diffusion of technology and the cultivation of essential skills, ultimately enhancing these nations' productive capabilities.

It is essential to recognize that trade primarily contributes to poverty reduction through fostering economic growth. Given that GVCs, with their emphasis on economic growth, tend to yield more substantial benefits than traditional trade in final goods, the poverty reduction attributed to GVCs is also typically more pronounced. For instance, regions in Mexico and Vietnam characterized by more intense GVC participation have demonstrated swifter income growth and more pronounced reductions in poverty levels (World Bank, 2020). This underscores the notable potential of GVCs to not only spur economic growth but also alleviate poverty in developing economies.

Spain faces a complex economic landscape characterized by a growing reliance on Global Value Chains (GVCs) and a notable incorporation of foreign value into its exports. While this participation has benefits in terms of global economic integration, it also poses challenges. Spain's engagement in GVCs, particularly in sectors like chemicals-pharmaceuticals and transportation equipment, results in a substantial portion of its export value originating from imports, making its economic performance highly dependent on global supply chains. Moreover, the economy's participation in GVCs is relatively low compared to some counterparts, potentially indicating limited control over value chain dynamics. This raises

concerns about Spain's vulnerability to external shocks and its ability to capture the full value of its exports (Bonet, 2014; Juste et al., 2016; Prades & Villanueva, 2017).

Furthermore, the growth of services in Spain's traditional, labor-intensive industries and the increasing import of intermediate goods signal an evolving economic landscape. While services enhance competitiveness, they primarily cater to the domestic market, potentially limiting opportunities for international expansion and diversification. Managing this transition effectively is crucial for Spain to strike a balance between the benefits of global integration and safeguarding its economic stability and value capture in an increasingly interconnected world economy.

The research is guided by a series of pertinent questions:

- What proportion of the Value Added (VA) generated in Spain is exported by each industry?
- What are the prevailing trends in Spanish exports, imports, and the trade balance?
- Who are the key trading partners for each sector in Spain?
- What are the overarching trends in Spanish exports?
- How has the behavior of exports, imports, and the trade balance of Spain varied across sectors with its primary trading partners?

Based on these questions, the following objectives are established:

General Objective: To analyze the dynamics of Spain's foreign trade with its major partners through TiVA (Trade in Value Added).

Specific Objectives:

- To define the key conceptual nodes and the research context related to foreign trade, global value chains, TiVA indicators, and Spain.
- To compare methodologies and databases for studying the dynamics of Spain's foreign trade with its primary partners.
- To identify Spain's primary trading partners during the study period.
- To analyze Spain's production and trade structure by sectors with its primary trading partners.

Answering these questions and objectives will provide a comprehensive understanding of Spain's trade dynamics, the role of different industries in export activities, evolving trends in

international trade, and the interplay of Spain's trade with its key partners across prominent sectors.

This investigation encompasses an exploration of Spain's international trade dynamics, unfolding across three sections. The first segment embarks on a literature review, delving into three pivotal domains: foreign trade, international relations, and the Inter-Country Input-Output tables. This section synthesizes key insights from prior research to establish a comprehensive foundation.

Subsequently, the second part contents the methodology deployed for the analysis. It elucidates the analytical tools and techniques harnessed in comprehending the web of Spain's trade dynamics.

The third section emerges as the crux, thus, unveiling researched results, their implications, and pertinent discussions. It illuminates the trends, patterns, and changes discerned within Spain's exports, imports, and trade balance across various sectors and their principal trading partners.

Finally, the investigation culminates in a set of well-founded conclusions, thoughtfully synthesized from the preceding sections, and seamlessly aligned with the overarching research questions. These conclusions encapsulate Spain's positioning within the global trade arena, the evolving role of different industries, and the prospects and challenges that define its contemporary trade landscape.

## **I. Literature Review and Contextual Framework**

### *1.1. Foreign Trade and International Relations: An Exploration*

In order to Sturgeon (2013) remarks, internationalization within the realm of contemporary economic globalization is fundamentally underpinned by a duo of intricate mechanisms that orchestrate the integration of economies across borders. Firstly, there exists the spatial expansion of markets, ingeniously facilitated by arms-length trade. This mechanism manifests as a pivotal conduit through which nations engage in cross-border commerce, disseminating their goods and services to distant corners of the globe. Here, the dynamics of supply and demand interact across international frontiers, orchestrating a complex trade flows and economic interdependencies.

The second mechanism propelling internationalization encompasses the substantial enlargement of the internal structures within multinational enterprises (MNEs). This evolution

is prominently precipitated by the phenomenon of foreign direct investment (FDI), wherein MNEs strategically establish operational footholds in foreign jurisdictions. After this strategic placement, intra-group trade ensues, fostering intricate webs of inter-enterprise transactions among affiliates under the same corporate umbrella. This intricate intra-group trade constitutes a distinctive dimension of international business, where goods, services, and knowledge circulate seamlessly within the MNE's network, thereby amplifying the global footprint of these multifaceted entities.

Collectively, the interplay of arms-length trade and the intricate expansion of MNEs through FDI and intra-group trade embodies the complex fabric of internationalization that characterizes the contemporary global economic landscape. This multifaceted orchestration engenders the spatial and structural transformation of economies, underscoring the intricate and interconnected nature of today's global commerce (Dicken, 2007; Sturgeon, 2013).

Following the 1990s, international trade experienced a swift and dynamic expansion, driven primarily by the proliferation of Global Value Chains (GVCs). This era witnessed an unprecedented convergence among countries, marked by a notable reduction in economic disparities and a significant alleviation of poverty. These notable achievements were propelled by the fragmentation of production processes across nations and the deepening interconnections among businesses. Nations that seamlessly integrated into the GVC ecosystem, such as Bangladesh, China, and Vietnam, experienced remarkable increases in productivity and income, with the most substantial poverty reductions occurring precisely in these countries (World Bank, 2020).

Nevertheless, in contemporary times, the assumption that trade will remain an unequivocal engine of prosperity can no longer be taken for granted. Since the global financial crisis of 2008, international trade has displayed sluggish growth, and the once robust expansion of GVCs has noticeably decelerated. Over the past decade, transformative events of a magnitude akin to the groundbreaking shifts of the 1990s, exemplified by China's and Eastern Europe's emergence in the global economy and pivotal trade agreements like the Uruguay Round and the North American Free Trade Agreement (NAFTA), have been notably absent from the international trade landscape (European Central Bank, 2016).

Simultaneously, two potential challenges of significant magnitude have come to the forefront. Firstly, the emergence of disruptive technologies, such as automation, 3D printing and other, that diminish the reliance on human labor, holds the potential to bring production

closer to end consumers, potentially reducing both domestic and international labor demand. Secondly, the escalation of trade disputes among major global economies raises the specter of a potential retraction or fragmentation of Global Value Chains (GVCs), the intricate networks underpinning contemporary international trade (R. Johnson & Noguera, 2012a)

The fundamental concept that underscores the dynamics of GVCs is the fragmentation of complex products like automobiles and computers. This fragmentation enables nations, including those in the early stages of economic development, to specialize in producing simpler components or tasks, facilitating their participation in global trade networks. However, the extent of a country's involvement in GVCs is influenced by multiple factors, including resource endowments, geographical positioning, market size, and institutional frameworks. Nevertheless, these determinants, while significant, do not act in isolation and do not solely dictate a nation's economic destiny. Policies, too, play a pivotal role in shaping a country's position within GVCs (R. C. Johnson & Noguera, 2012b).

Crafting policies that can attract Foreign Direct Investment (FDI) becomes a vital strategy to bridge gaps in capital, technology, and managerial expertise. Moreover, liberalizing domestic trade while concurrently engaging in negotiations for the liberalization of foreign trade can help surmount constraints imposed by limited domestic markets, enabling enterprises to transcend the confines of local demand and input sourcing. The improvement of transportation and communication infrastructure, coupled with the introduction of competition in these essential services, becomes instrumental in mitigating the disadvantages posed by vast geographical distances. Lastly, active participation in comprehensive integration agreements can serve as a catalyst for institutional and policy reforms, particularly when complemented with technical and financial assistance, thus amplifying a nation's capacity to engage effectively in GVCs (Johnson & Noguera, 2012c).

As asserted by Bonet (2014), in the context of the swift fragmentation observed within global production chains, industrial sectors can bolster their competitiveness when they enjoy unfettered access to imports of raw materials, intermediate goods, and foreign services. While multilateral, regional, or bilateral trade liberalization measures undeniably contribute positively to the export sector's competitiveness, it is worth noting that even autonomous trade liberalization, characterized by the unilateral removal of tariffs, can yield substantial advantages in this regard.

The breakdown of gross exports into three key components is a pivotal aspect of trade analysis: (1) Exports of domestic value added, which can be subdivided into either (a) those directly consumed by the importing nation or (b) those reused and exported to a third country; (2) Re-imported domestic value added, and (3) Foreign value added that is integrated into domestic exports (Koopman et al., 2014).

In a global context, the prevalence of a relatively higher proportion of services originating from foreign countries is a characteristic often observed in economies that do not predominantly rely on innovation as their core competitive advantage. This phenomenon is notably prevalent in emerging and developing economies. The strong correlation between the external sourcing of services and the acquisition of intermediate goods implies that a substantial portion of foreign services within exports is embedded within the importation of intermediate goods. Consequently, economies involved in the transformation and assembly of intermediate inputs can gain access to essential services required for participation in Global Value Chains (GVCs) and the maintenance of their competitive positions through the importation of intermediate goods. These intermediate goods are typically supplied by multinational corporations that lead GVCs (Juste et al., 2016).

The existing academic discourse has frequently interpreted the trade collapse and subsequent robust recovery experienced during the period from 2009 to 2011 as a crisis-induced, temporary deviation from long-term trade trends. Freund (2009) has highlighted the changing dynamics between trade and GDP during economic recessions. Trade tends to experience a steeper decline compared to historical non-recessionary co-movements with output, driven in part by inventory drawdowns and a preference for sourcing from domestic suppliers during economic downturns. The presence of Global Value Chains can further amplify this volatility through what is known as “bullwhip effects”, whereby changes in final demand can lead to larger inventory adjustments throughout production chains. Notably, the sharp decline in trade observed during the Great Recession can be attributed, at least in part, to a significant reduction in investment, which typically exhibits a higher import content in comparison to other components of GDP (Gandoy, 2019).

Given the complexities and implications surrounding Global Supply Chains, there exists a compelling avenue for future research and discourse to explore their dynamics and impact on international trade and economic development.

The concept of Global Value Chains (GVCs) has its roots in the 1970s when it was initially referred to as “commodity chains”. The primary objective was to meticulously trace all inputs and transformations leading to the final product and describe the processes involved in its production.

In the 2000s, there was a shift in terminology, and the term “global value chain” emerged, which was coined within the international business literature. This shift aimed to view trade and industrial organization as a value – added chain. The concept of Global Value Chains sought to encompass the determinants of the organization of global industries, providing a theoretical framework for analyzing value chains and describing various forms of global management within GVCs. More recently, research has started to emphasize the concept of a “network” instead of a “chain”, highlighting the complexity of interactions among global-level agents.

The growth of Global Value Chains has been particularly concentrated in sectors such as machinery, electronics, and transportation, primarily in regions specializing in these industries, including North America, Western Europe, and East Asia. Most countries in these regions participate in complex GVCs, producing advanced manufacturing and services, and engaging in innovative activities. In contrast, many countries in Africa, Latin America, and Central Asia continue to produce basic commodities, which are subsequently processed in other countries as part of the GVCs.

In the context of the globalized world (Prades-Illanes & Tello-Casas, 2021) article titled “World Trade and the COVID-19 Crisis: The Role of Global Value Chains” sheds light on crucial concepts that underpin the complexities of international commerce. Through (Hummels et al. (1998) contributions, their work delves into the participation of nations in Global Value Chains (GVCs) and develop metrics like backward and forward linkages. Building upon this research, we explore these concepts in greater detail, offering a comprehensive understanding of how backward and forward linkages illuminate the role and integration of economies within GVCs. This exploration helps us discern the varying degrees of an economy's involvement in global trade and its proximity to the final consumer:

Participation in Global Value Chains (GVCs) within each sector-region is quantified by examining both backward and forward linkages. Backward linkages assess the value-added originating in other regions or countries that is embedded in exports or sales to other regions within the same country. Conversely, forward linkages measure the value-added generated



within the region, which will subsequently flow to other regions, whether within the same country or abroad, distinct from the initial destination of domestic sales or exports.

When considering the sum of backward and forward linkages as a percentage of total gross exports, it offers an approximation of an economy's comprehensive involvement in GVCs. A higher value for this indicator reflects a deeper integration of the country into international trade networks. This is observed either because the country's exports necessitate the inclusion of imported intermediate goods from other countries or because its exports are employed as intermediate inputs in the production processes of other countries' exports.

Moreover, the disparity between forward and backward linkages serves as a descriptor of an economy's position within GVCs. More precisely, a lower value in this difference suggests that the economy's exports are closely tied to the final consumer. In contrast, a higher value indicates that the economy is specialized in providing factors of production that will be subsequently re-exported, positioning it further upstream in the production chain, away from the final consumer (Prades & Villanueva, 2017).

Figure 1. Decomposition of Gross Exports (Forward/Backward Participation)

GROSS EXPORTS						
DOMESTIC VALUE ADDED (DVA)					FOREIGN CONTENT	
FINAL OUTPUTS	INTERMEDIATE CONSUMPTION					
	Intermediates for final production	Intermediates for re-export to third partners	Re-imported intermediates (final or intermediate consumption).	Double accounting	Foreign value added (FVA) in final and intermediate consumption	Double accounting
Forward					Backward	

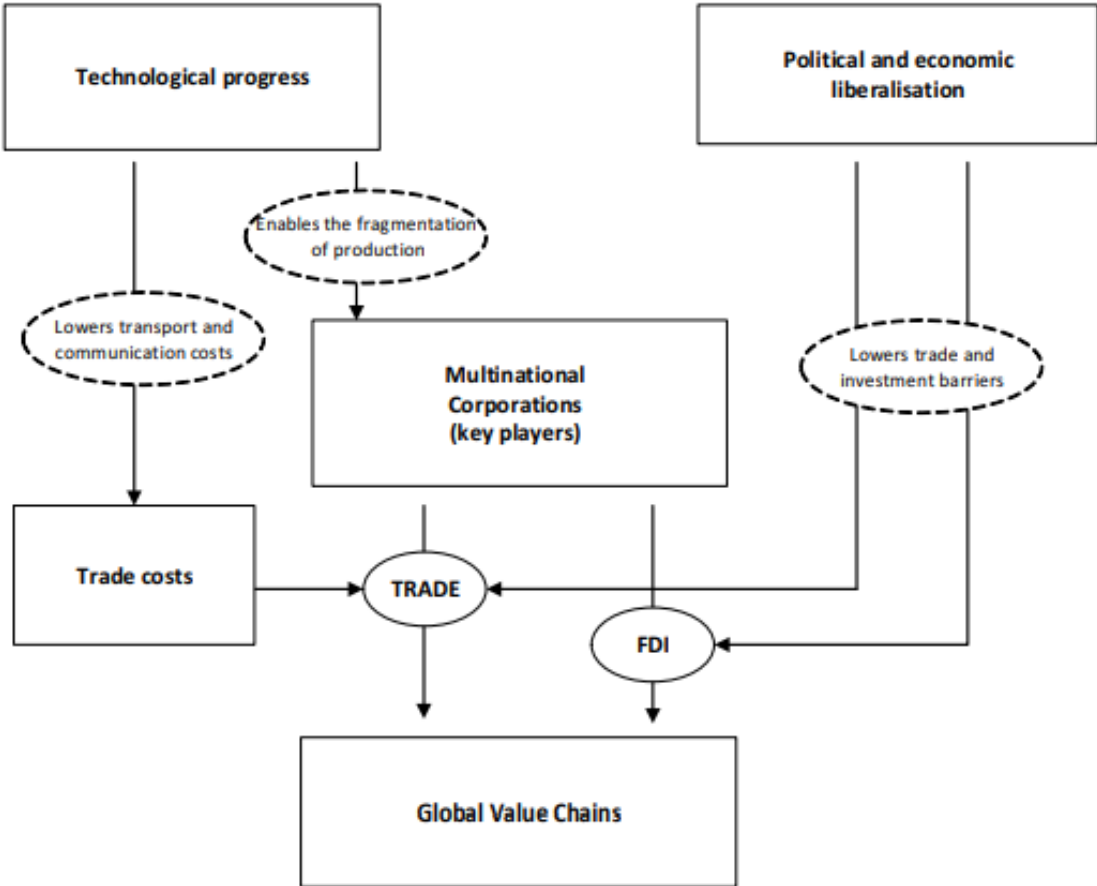
Source: Banco de España & Koopman et al. (2014)

Between 2000 and 2014, there was a consistent growth in participation within Global Value Chains (GVCs), a trend that saw a brief interruption in 2009 due to the global trade collapse. Over this period, the average participation in GVCs increased by a significant 9 percentage points, ultimately reaching 57% of total gross exports. However, this upward trajectory started

to level off around 2011, with participation plateauing at 56.2% by 2014, as stated by Prades & Villanueva (2017).

The literature offers multiple insights into the factors contributing to this slowdown in GVC expansion. One explanation revolves around the high level of maturity that GVCs have achieved, suggesting that their development has reached a point where further substantial growth becomes challenging. Additionally, the rise of protectionist tendencies in global trade, along with increasing costs in emerging economies, has prompted some companies to engage in reshoring, relocating their operations back to their home countries. This shift also results from a strategy to substitute imported inputs with domestically produced ones. Moreover, technological advancements, especially in automation and robotics, have fueled the trend of relocating certain manufacturing processes closer to the final market, reducing reliance on offshore production. Lastly, changes in demand patterns have also played a role, with preferences shifting toward products and industries that are less reliant on international production networks (Juste et al., 2016).

Figure 2. Main drivers of Global Value Chains.



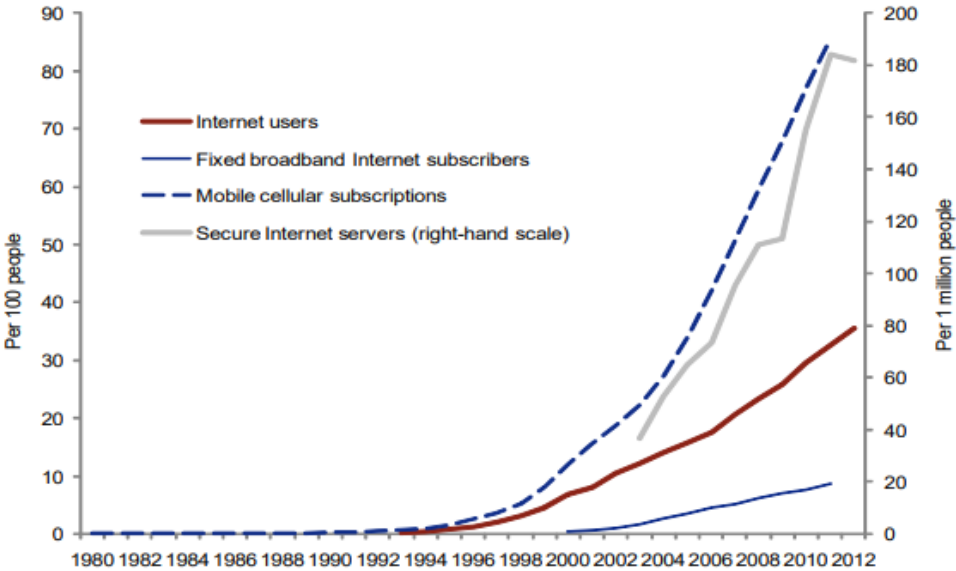
Source: Amador & Cabral (2014)

Figure 2, titled "Main Drivers of Global Value Chains," as proposed by Amador & Cabral (2014), provides a concise overview of the critical elements influencing the expansion and operation of global value chains (GVCs). These determinants play a central role in comprehending the intricate dynamics of GVCs and their profound implications for global trade and economic advancement:

a). Technological Progress and Trade Costs: Technological advancements play a determinant role in shaping GVCs. They enable more efficient communication, transportation, and production processes, reducing trade costs and facilitating the integration of various stages of production across borders. Innovations such as the internet and digital technologies (Figure 3) have transformed the way companies coordinate and manage their global operations within GVCs.

b). Economic and Trade Liberalization: The liberalization of trade through multilateral, regional, or bilateral agreements fosters an environment conducive to GVC expansion. Reduced trade barriers, including tariffs and quotas, create opportunities for firms to access international markets more easily. Liberalization encourages cross-border trade and investment, facilitating the global dispersion of production processes.

Figure 3. Information and Communication Technology (ICT)



Source: World Bank (2014)

c). FDI Flows and Intra-Firm Trade: Foreign Direct Investment (FDI) is a critical driver of GVCs. Multinational corporations (MNCs) play a central role by establishing subsidiaries, joint ventures, or partnerships in different countries. These MNCs engage in intra-firm trade, where various stages of production occur within the same corporate entity but across different

countries. This intra-firm trade within MNCs is a fundamental feature of GVCs, allowing for efficient specialization and coordination.

d). Multinational Corporations (MNCs) as Key Players: MNCs are key actors in GVCs. They are often at the forefront of driving international production networks, leveraging their resources, technologies, and global reach. MNCs are central in coordinating and orchestrating the activities of various suppliers, manufacturers, and service providers across different countries.

e). Trade Costs: Trade costs encompass various expenses associated with international trade, including transportation, logistics, customs procedures, and regulatory compliance. As trade costs decrease, it becomes more cost-effective for firms to participate in GVCs, as these costs directly affect the competitiveness of production networks.

f). Foreign Direct Investment (FDI): FDI involves the establishment of business operations or acquiring assets in foreign countries. It enables firms to create a physical presence in foreign markets, allowing for closer integration into GVCs.

Understanding these main drivers of GVCs is crucial for policymakers, businesses, and researchers as they navigate the complex landscape of global trade and economic interdependence. These drivers influence the distribution of benefits and challenges across countries and industries, shaping the evolving landscape of international production and trade.

Having gained a comprehensive understanding of global value chains (GVCs). Their pivotal role in contemporary international trade. It becomes evident that a nation's engagement with GVCs depends on multiple factors, as outlined by the World Bank (2020). These factors encompass the degree of a country's participation in GVCs, its specialization in specific sectors within the global trade landscape, and its level of innovation.

Moreover, Díaz-Mora et al. (2020) emphasize the critical importance of high-quality services such as transportation, communication, logistics, and quality control in facilitating the seamless functioning of the intricate manufacturing processes that involve various firms across different countries within GVCs.

Transitioning from this foundational knowledge, the subsequent section will explore the analysis of foreign trade through input-output models. This analytical approach serves as a valuable tool for comprehending the complexities of international trade flows and discerning their economic ramifications. By employing input-output models, we can gain deeper insights into the interdependencies of economies, trade patterns, and the broader implications of

globalization on a country's economic structure. This section aims to elucidate how input-output models contribute to our understanding of foreign trade and offer a robust framework for assessing the consequences of international economic integration.

### *1.2. Analyzing Foreign Trade through Input-Output Models*

The information embedded within global input-output tables serves as a vital resource for dissecting the intricacies of Global Value Chains (GVCs) and, consequently, comprehending the intricate web of trade relations among nations (Prades & Villanueva, 2017).

Presently, there lacks an exhaustive and robust statistical framework for gauging international production fragmentation. Nonetheless, three methodological approaches can be considered as foundational (Coeuré et al., 2010):

Direct Measurement within Corporations: This approach entails directly assessing and quantifying the degree of production fragmentation within individual firms.

Measurement via Standard Trade Statistics: A conventional method involves evaluating trade statistics and utilizing these figures to infer the extent of production fragmentation.

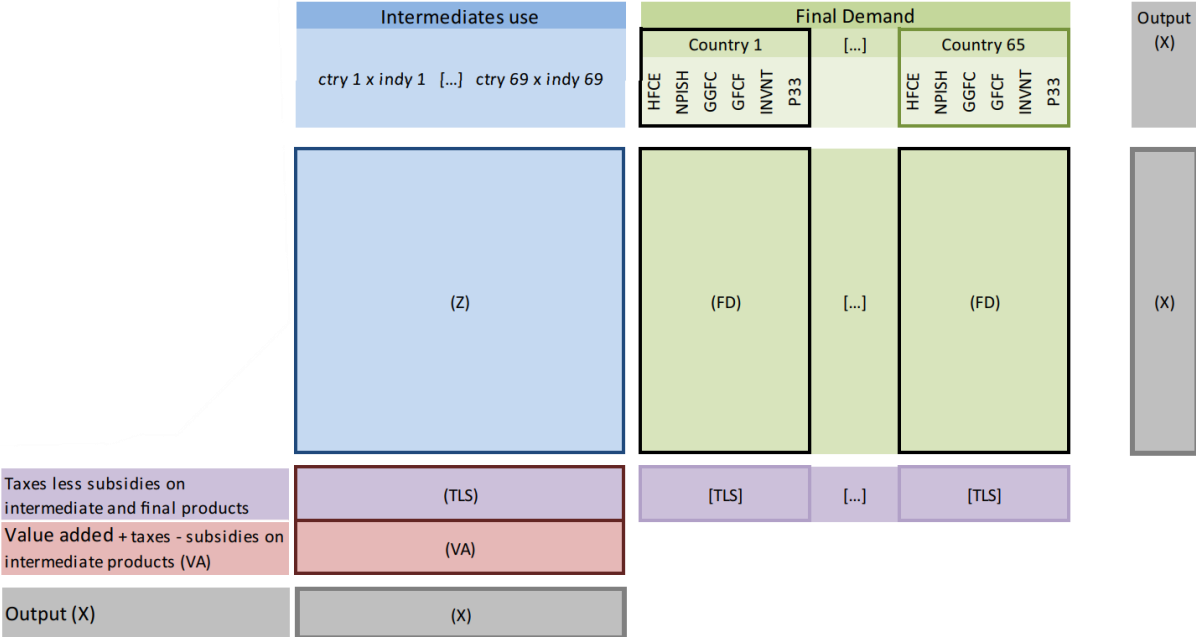
Indirect Measurement through Input-Output Tables: Among these techniques, the employment of international input-output tables emerges as the most comprehensive. These tables afford an extensive vantage point, enabling the scrutiny of interconnections between nations and industries. Furthermore, they facilitate the quantification of the extent to which domestic sectors rely on both domestic and foreign sectors for inputs and dependencies.

The indirect approach, grounded in international input-output tables, provides a meticulous breakdown of the origin and destination of intermediate goods and services that traverse sectors across various countries. By utilizing the Leontief inverse matrix, it becomes possible to account for all relationships between nations and sectors, capturing the comprehensive value of imported inputs employed directly or indirectly within each sector. This method illuminates the intricate web of international production relationships and enables a thorough analysis of production fragmentation on a global scale.

The structure of ICIO tables (Figure 4, following *OECD Inter-Country Input-Output (ICIO) Tables - OECD*) follows the typical pattern of national input-output tables. The matrix of interindustry relationships consists of  $n * k$  rows and  $n * k$  columns (with  $n$  representing the number of industry sectors and  $k$  the number of countries). It records the exchanges of intermediate inputs between sectors and countries, such that the element  $X_{ij}^{cp}$  indicates the

purchases made by sector  $j$  in country  $p$  (column sector – country) from sector  $i$  originating in country  $c$  (row sector – country). The sum of the columns represents the total intermediate consumption required to carry out the production of the column sector – country, depending on the technology and productive structure. It's worth noting that the ICIO (Inter-Country Input-Output) allows distinguishing between intermediate purchases of domestic goods (when  $c = p$ ) and intermediate imports (when  $c \neq p$ ).

Figure 4. Inter-Country Input-Output Table, e.g.



Source: OECD Inter-Country Input-Output (ICIO) Tables - OECD

The matrix of final demand, positioned to the right of the intermediate input matrix, consists of  $n * k$  rows and  $k * f$  columns, with  $f$  representing the components of final demand (private consumption, public consumption, investment). Each element,  $d_i^{cp}$ , expresses the final demand made by the column country,  $p$ , for goods and services from sector  $i$  originating in the row country,  $c$ . Once again, it is possible to differentiate between the portion of each final demand component covered by domestic production (when  $c=p$ ) and the portion satisfied by final imports (when  $c \neq p$ ).

Finally, the tables incorporate, at the end of the matrix of interindustry relationships, a row vector of value added of order  $n * k$ , which records the value added (income) generated in each sector by the column sector. The sum of each column of the matrix of interindustry relationships and its corresponding value added is the production value of each productive sector in each country. Calculating this for all countries and sectors yields a row vector of output of order  $n * k$ .

Global input-output tables offer a significant advantage in providing a more precise measurement of international trade in terms of value added. Traditional trade statistics, when presented in gross terms, do not account for the value of imported intermediate goods when quantifying export values. This can lead to an artificial inflation of trade figures, as the value of imported intermediates is counted in both a country's imports and exports. Consequently, this overestimates the volume of global trade, especially in the context of increased international production fragmentation.

International input-output tables have introduced a valuable set of tools for researchers and policymakers. They enable the estimation of the proportion of a country's export value that originates from imported inputs, shedding light on the intricacies of global value chains. Additionally, they serve as a proxy for assessing the extent of global value chain engagement on a global scale, considering the share of "double-counted" intermediates. These tables are instrumental in analyzing the significance and nature of global value chain participation for specific sectors within particular countries (Sturgeon, 2015).

Traditionally, the literature has implemented two distinct types of measures derived from classical input-output (I-O) data (refer to Hijzen, 2005). The first type of I-O-based measure primarily focuses on the foreign content within domestic production. It assesses the proportion of (direct) imported inputs in the overall production or total inputs. This measurement was originally introduced by Feenstra & Hanson (1996) and has subsequently seen widespread adoption in various forms. Feenstra & Hanson (1999) further distinguish between broad and narrow definitions of outsourcing. The broad definition encompasses the value of intermediate goods that every manufacturing industry purchases from all other industries. In contrast, the narrow definition of outsourcing considers only inputs acquired from the same industry that produces the final good. More recently, Feenstra & Jensen (2012) employ firm-level data on imports and production to enhance the classical I-O sectoral estimates of imported inputs.

The second I-O-based measure of fragmentation centers on assessing the (direct and indirect) import content of exports. It was initially formulated by Hummels et al. (1998) and Hummels et al. (2001), referred to as "vertical specialization". This measure identifies scenarios in which production spans at least two countries, and goods traverse international borders at least twice. In contrast to the first I-O-based measure, which calculates the direct share of imported inputs in gross output, this measure is narrower in scope as it adds the condition that a portion of the resulting output must be exported. Chen et al. (2005) updated the analysis

originally presented by Hummels using more recent I-O tables. Their findings also suggest an increase in the trade of vertically specialized goods over time. Numerous other studies have applied this methodology, often with slight modifications from the original formulation, and have consistently identified a rising trend in vertical specialization activities.

The concept of measuring global value chains (GVCs) through Inter-Country Input-Output (ICIO) analysis has evolved significantly from its early origins to a comprehensive framework. The evolution of measures in the context of International Commodity Input-Output (ICIO) analysis has undergone significant developments from the seminal work of Feenstra & Hanson (1996) to the comprehensive framework provided by Koopman et al. (2014).

Daudin et al. (2011) further contributed by reallocating the value-added contained in trade in final goods to each country involved in its production. Their approach encompassed calculating the share of imported inputs in exports, the share of exports used as inputs in exports of other countries, and the domestic content of imports.

More recent studies, such as Antràs et al. (2012) and Fally (2012), ventured into utilizing classical I-O data to gauge the average position of industries within the production chain. Concepts like “upstreamness” and the number of production stages embodied in an industry's output emerged as valuable indicators of industry dynamics.

A pivotal milestone in ICIO analysis was the work of Koopman et al. (2014). They integrated and unified existing measures into a block matrix formulation. Their framework facilitated the complete breakdown of gross exports into value-added components, bridging the gap between official gross statistics and value-added trade measures. This comprehensive approach allowed for a complete breakdown of gross exports into domestic and foreign content, including exports that end up with the direct importer, returns from abroad to the exporting country, and indirect exports to third countries.

Complementing these approaches, Amador & Cabral (2014) introduced a relative measure of vertical specialization-based trade by combining data from product-specific and country-generic I-O matrices with international trade data.

In today's globalized landscape, understanding the concept of “country of origin” has become increasingly complex. Analyzing an industry's export potential and competitiveness now demands a comprehensive examination of its integration into global value chains and the role of trade in intermediate inputs. Therefore, the analysis of gross trade flows must be



complemented by a deep exploration of trade in value-added, shedding light on the original source country of the value-added component.

The fundamental idea behind trade in value-added is that both domestic and foreign value-added collaborate to produce exports, which may subsequently be embodied in other products or consumed as final goods and services. This concept recognizes the significance of importing intermediate products for their incorporation into exports, resulting in gross export values surpassing their domestic value-added components. Moreover, the domestic value-added within exports can circulate globally within intermediate products, with a portion returning to the domestic economy in this ongoing cycle.

Understanding Global Value Chains (GVCs) and their implications for international trade and economic policies relies heavily on robust ICIO databases. Below, we provide an overview of some prominent ICIO databases, highlighting their geographic and sectoral coverage:

Table 1. Comparative Overview of Key ICIO Databases

<b>ICIO Database</b>	<b>Geographical coverage</b>	<b>Sector breakdown</b>
GTAP (Global Trade Analysis Project)	129 countries	57 sectors
WIOD (World Input-Output Database)	40 countries	35 sectors
OECD-WTO TiVA (Trade in Value Added) Database	57 countries	18 sectors
UNCTAD-Eora GVC Database	187 countries	25 to 500 sectors
IDE-JETRO (Institute of Developing Economies - Japan External Trade Organization)	10 countries	76 industries

Source: Own elaboration.

Among these databases, the OECD-WTO Trade in Value Added (TiVA) database stands out. It was publicly launched relatively recently and has predominantly found its utility in policy-oriented studies. The *Guide to OECD TiVA Indicators, 2021 Edition* (2022) has effectively summarized the essential findings and policy implications derived from their research on GVCs, encompassing various aspects such as trade and investment policies tailored to GVCs. Additionally, the OECD has produced a series of comparable country notes, featuring indicators that shed light on the significance of value-added trade and each country's participation in the global GVC network.

The availability of comprehensive global Input-Output (I-O) matrices has prompted methodological innovations in measuring GVCs. Presently, the OECD-WTO's TiVA Indicators have emerged as the forefront choice among researchers. These indicators offer the most accessible and transparent I-O tables, as noted by Abdmoula (2023); Kersan-Škabić (2017); Sturgeon (2015), making them a preferred resource for in-depth analyses of GVC-related phenomena.

These ICIO databases and evolving metrics have significantly advanced our ability to dissect the intricate web of GVCs and have proven instrumental in informing evidence-based policies and strategies within the global economic landscape.

### *1.3. Spain's Contextual Background: A Focused Examination*

The intricate dynamics of supply chains often exhibit complexities that go beyond linear sequences, frequently resembling a hub-and-spoke pattern (Figure 5). To gain a deeper understanding of these supply chains, we examine the geography of supply networks, highlighting Spain's role within the global landscape.

The European supply chain model stands apart from those of China, Japan, or the United States due to its greater reliance on imported capital and skilled labor content in exported value-added. Europe's inter-industry exchanges tend to be more homogeneous, suggesting a higher degree of integration within companies and less pronounced wage disparities among European countries.

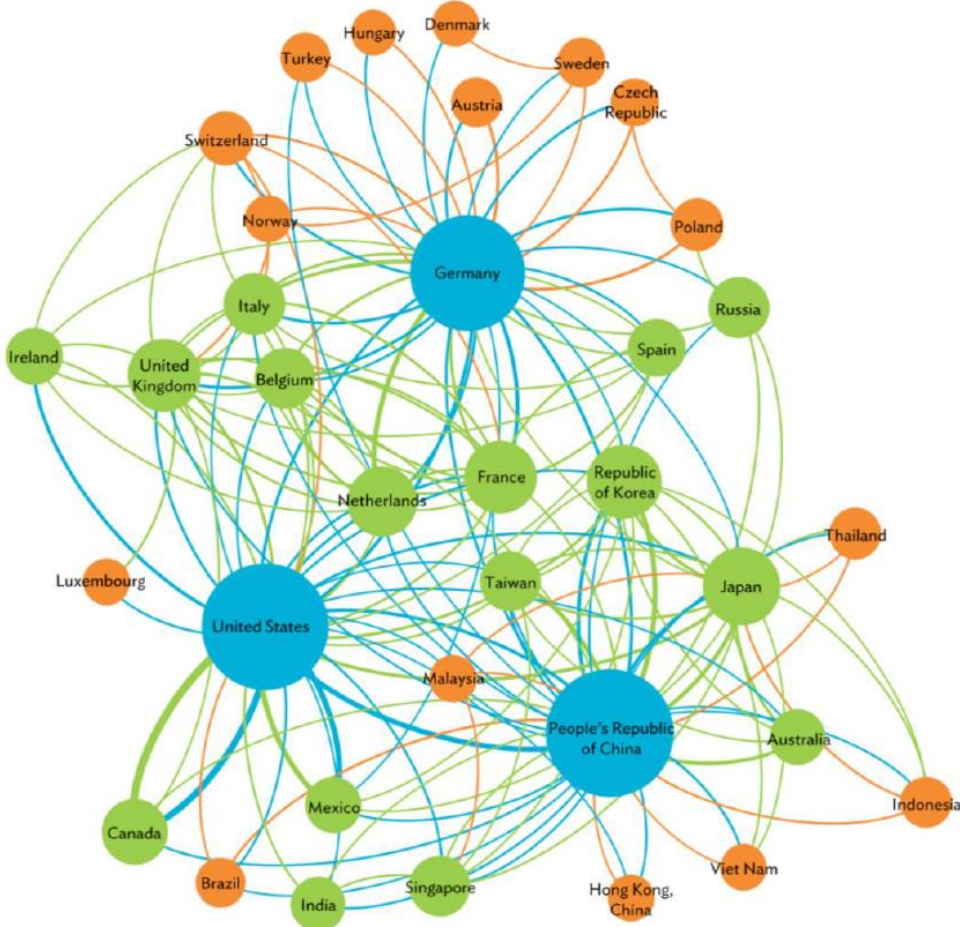
Notably, Bonet (2014) highlights that Spain's diversification in exported value-added surpasses its gross export diversification. This shift underscores a fragmented production landscape, mirroring the externalization of specific phases of Spanish corporate production to foreign locations or a strategic focus on production phases. Such strategies involve the offshoring of certain tasks while retaining higher value-added processes in Spain. Concurrently, Spain has emerged as an attractive destination for offshored tasks from foreign companies, especially those with high-value components.

Services play a more deeply role in international trade than often apparent from raw data. In terms of value-added, services constitute an average of around 48% of gross exports in OECD countries, with a more substantial presence in highly developed and service-oriented economies. Spain stands out with 56% of its value-added exports attributed to services, surpassing both the OECD and EU-27 averages. This emphasizes the country's specialization

in this sector, particularly in tourism, and the growing significance of services as essential inputs in the production of goods.

Furthermore, over a third of the value of Spanish goods exports is comprised of services components, and this proportion continues to rise. This trend is particularly striking in sectors such as food and beverages, textiles, footwear, and transportation equipment, with the latter experiencing significant growth in recent years.

Figure 5. Supply Chain Dynamics: A Holistic View



Source: Prades & Villanueva, (2017)

Between 2000 and 2014, Spain's average participation in Global Value Chains (GVCs) increased by 9 percentage points, reaching 57% of gross exports. Nevertheless, this upward trajectory flattened after 2011, stabilizing at 56.2% in 2014. Spain mirrors the global trend, with GVC participation rising from 44.7% in 2000 to 52% in 2011. Since 2011, this trend has plateaued, aligning with global patterns, and Spain's GVC participation reached 51.4% in 2014 (Prades & Villanueva, 2017).

Spain's participation in GVCs aligns with that of other economies in its proximity, such as Germany, France, and Italy. Spain's participation profile is characterized by reduced forward participation and roughly average backward participation compared to all countries (Bonet, 2014). However, it's worth noting that different industries within Spain exhibit varying levels of backward and forward participation. In general, as in other countries, the industrial sector's exports tend to incorporate a higher degree of imported content (backward participation), while service sectors typically have a lower import content and a more substantial forward participation.

Spain's average backward participation was 24.1% in the years preceding the crisis (2008), positioning it at the lower end of the country distribution. However, by 2014, it had reached the average for countries, indicating a significant increase in the import intensity of its exports from 2007 to 2014.

From an aggregate perspective, approximately 21% of Spain's gross exports derive from foreign sources. Notably, key sectors in Spain's exports, such as chemicals-pharmaceuticals and transportation equipment, incorporate a higher proportion of foreign value. Delving deeper into the importation of intermediate goods and services, data reveals that, on average, 30% of the imported content is incorporated into exports. Particularly striking are sectors like textiles and transportation equipment, where imported inputs account for up to 45% of their total value.

According to Prades & Villanueva (2017), Spain's relatively low participation in GVCs is attributed to the proximity of its exported products to final consumer goods. Over time, Spanish exports have seen an increase in their import content since the onset of the economic crisis. This phenomenon is partly due to the growing importance of more import-intensive products in Spain's overall export portfolio, such as manufactured chemical products and metallurgy.

In industries traditionally reliant on labor and natural resources, services primarily cater to the domestic market. These sectors have witnessed substantial growth, indicating that, in industries where international competition largely hinges on production costs, services serve as a critical competitive factor, allowing for differentiation. Consequently, in high-income economies like Spain, services predominantly find their market within the domestic economy (Juste et al., 2016).

This comprehensive analysis of Spain's position within global supply chains offers invaluable insights into the evolving landscape of international trade, underscoring the growing role of services and the transformative nature of production processes.

## **II. Materials and methods**

This study embarks on an exploration of Spain's intricate economic landscape, delving into the dynamics of its production structure, foreign trade activities (imports and exports), and the value added by various industries. The primary objective is to gain profound insights into the behavior of Spain's production structure within the context of foreign trade. Furthermore, it aims to discern how this structure influences value creation, positioning within global supply chains, and the intricate web of geopolitical and geo-economics' relations.

In this section, we elucidate the methodological framework employed in this research endeavor, delineating the data sources, analytical tools, and approaches harnessed to unravel the multifaceted dimensions of Spain's economic landscape.

The research methodology hinges on a comprehensive blend of qualitative and quantitative analyses. The prevailing approach is dialectical – materialist, synthesized through the theoretical and empirical methods, techniques, and procedures meticulously tailored to address our research questions. This approach allows to scrutinize the intricate web of facts and data with precision and depth, ensuring a thorough exploration of the subject matter at hand. It equips us with the tools necessary to extract meaningful insights and answers to our research questions, ultimately enriching the overall quality and rigor of the study.

The present research is centered around the data period available within the “Full International and Global Accounts for Research in Input-Output Analysis” (FIGARO), spanning from 2010 to 2020, inclusive. Our investigation has been meticulously organized into three distinct research phases, facilitating a structured analysis and the coherent presentation of results.

### *Phase 1: Consultation of secondary information sources*

In this initial phase, we conducted an extensive review of existing secondary information sources. This endeavor significantly enhanced our comprehension of the subject matter, underpinned by the application of theoretical methods. Within this phase, two fundamental methods were employed:

Historical-Trend Analysis: This method was instrumental in evaluating the evolution and trends within the core theoretical frameworks associated with the various facets of the research object. It provided valuable insights into the contextual background, enabling a deeper understanding of the subject's development over time.

Logical Method: Under the logical method, we established the connections between existing components, adopting a dialectical approach. This approach, rooted in dialectical reasoning, enabled us to develop the different stages of the research by deducing logical conclusions based on the answering at various research questions.

For the application of these theoretical methods, we integrated three pivotal procedural elements at the theoretical level. These processes represent pairs of categories that dynamically complement each other in practical application. Analysis and Synthesis were foundational processes, allowing us to deconstruct complex information into manageable components and subsequently synthesize these components to derive comprehensive insights. Abstraction and Integration facilitated the extraction of key concepts from the wealth of information, with integration ensuring seamless incorporation of these abstracted elements into our research framework. Lastly, Deduction and Induction were pivotal in our approach. Deductive reasoning guided us in formulating conclusions based on established questions, while inductive reasoning played a vital role in generating debates and generalizations around observed patterns and data.

This rigorous and systematic approach in Phase 1 laid the foundation for subsequent phases of our research. It ensured not only depth but also coherence in our investigative journey, promising a robust and insightful exploration of our research questions.

Within this initial phase, we employed empirical methods to complement our research framework. The application of empirical methods, such as documentary analysis and web-based reference searches, proved instrumental in gathering essential data related to foreign trade, Input-Output tables (ICIO), exports, metrics, and other pertinent information. These empirical methods were instrumental in shaping the foundational aspects of our current investigation.

Documentary Analysis: A primary empirical method employed during Phase 1 was documentary analysis. This method involved a comprehensive review of relevant literature, research reports, academic publications, and official documents related to our research area. It allowed us to acquire a broad knowledge base on the subject matter, identify key research gaps,

and gain valuable insights from prior studies and analyses. This wealth of information formed the cornerstone upon which our research is built.

Internet-Based Reference Searches: Additionally, we leveraged the vast resources available on the internet to enhance our empirical approach. Specifically, we conducted web-based reference searches focused on pertinent aspects of our study, including foreign trade dynamics, ICIO tables, export statistics, and relevant metrics. These online searches facilitated access to data contributed by fellow researchers and institutions, serving as a crucial foundation for our present investigation.

By integrating both documentary analysis and internet-based reference searches, we not only ensured the comprehensiveness of our data sources but also established a strong empirical footing for our research endeavors.

### *Phase 2: Consultation of Primary Information Sources*

The development of this phase was primarily founded on the implementation of the measurement method. During our research, we calculated a set of 8 indicators related to Spain's foreign trade (both imports and exports) with countries and regions where trade occurs with greater intensity and significance, as outlined by Bonet (2014). These regions encompassed Germany, Italy, France, and Portugal (all EU members), as well as Switzerland, Russia, China, the United States of America, and the United Kingdom (key trading partners and OECD member states). The regions were categorized into three groups: (1) the European Union, (2) other OECD member countries, and (3) the Rest of the World.

The data pertaining to foreign trade were sourced from the 2010 to 2020 series of consolidated accounts provided by the Full International and Global Accounts for Research in Input-Output Analysis (FIGARO). The FIGARO project offers experimental EU-intercountry Supply, Use, and Input-Output Tables (EU-IC-SUIOTs), commonly known as the FIGARO tables. This collaborative initiative involves Eurostat and the European Commission's Joint Research Centre, resulting in a comprehensive dataset. Furthermore, for enhanced transparency and accessibility, we utilized the OECD-WTO version known as the Trade in Value Added (TiVA) Indicators, as advocated by Sturgeon (2015). These indicators are recognized for providing comprehensive and transparent Input-Output tables, aligning perfectly with our research questions.

The measurement of trade in value-added requires comprehensive global Input-Output (I-O) tables containing exhaustive information regarding bilateral transactions encompassing

both intermediate and final goods. These tables serve as the foundational data source essential for allocating the components of value-added within the complex network of the Global Value Chain (GVC) to each participating producer.

The data consolidated by FIGARO is structured within Input-Output tables, intricately segmented into multiple facets, including intermediate consumption by industry, final demand, and primary inputs such as gross value added and compensation of employees. This data is meticulously organized, not only by industry categories (21 sectors) but also by country, encompassing 46 distinct nations, with a final category dedicated to non-OECD member countries. Additionally, regional demarcations are delineated, consisting of the European Union, OECD member countries outside the European Union, and the Rest of the World.

To calculate the values associated with each of the scrutinized indicators, we meticulously adhered to the precise methodological directives promulgated by the Organization for Economic Co-operation and Development (OECD). These guidelines are comprehensively elucidated within the *Guide to OECD TiVA Indicators, 2021 Edition (2022)*.

The suite of examined indicators encompasses Structural Indicators, a set of eight calculated metrics, and Indicators based on the Origins of Value Added in Gross Exports and Imports, which comprise two similarly rigorously computed metrics. Drawing directly from the OECD Guide, we applied the specific methodologies pertinent to each of the following indicators:

**PROD (Production):** This indicator, denominated in EUR million, represents the gross output in industry  $i$  within country  $c$ . The equation (1) describes it as the production (gross output) at basic prices by industry  $i$  in country  $c$ . In the context of TiVA, the input-output tables provide data on the transactions between industries, including intermediate and final demand. PROD can be derived directly from the input-output tables, where each element in the PROD matrix represents the total production (gross output) of a specific industry within a country. It serves as a baseline measure of an industry's economic size and contributes to understanding the structure of the economy.

$$PROD_{c,i} = X_{c,i} \quad (1)$$

**VALU (Value Added):** Denominated in EUR million, this indicator is defined by equation (2) as the production (gross output) at basic prices minus the total intermediate inputs at basic prices. In essence, it signifies the value added at basic prices, inclusive of taxes less subsidies on purchases of intermediate products by industries. Value added encompasses



compensation of employees, consumption of fixed capital, net operating surplus, mixed income (e.g., profits and income of the self-employed and family members), and “Other taxes, less subsidies, on Production” (such as payroll taxes). In the context of TiVA, the VALU matrix is derived by subtracting intermediate inputs (purchases of goods and services from other industries) from the PROD matrix. This indicator helps identify industries that contribute significantly to the value-added component of the economy, essential for understanding economic structure and competitiveness.

$$VALU_{c,i} = W_{c,i} \quad (2)$$

PROD\_VASH (Value added as a share of Gross Output): Expressed as a percentage, this indicator is described in formula (3), signifying the value-added share generated by industry  $i$  in country  $c$ , represented as  $VALU_{c,i}$ , relative to the total output,  $PROD_{c,i}$ . These industry value-added-to-gross-output ratios substantially influence a country's shares of value added embodied in trade and final demand. It is vital for assessing the value-added intensity of industries. PROD\_VASH is calculated by dividing the VALU of industry  $i$  in country  $c$  by its corresponding PROD. In the TiVA framework, this information is obtained from the VALU and PROD matrices. High PROD\_VASH values indicate industries that are value-added intensive and contribute significantly to the value-added component of the gross output, while low values may indicate industries with a higher reliance on intermediate inputs.

$$PROD\_VASH_{c,i} = \frac{VALU_{c,i}}{PROD_{c,i}} = V_{c,i} \quad (3)$$

EXGR (Gross Exports), EXGR\_INT (Gross Exports of Intermediates), EXGR\_FNL (Gross Exports of Final Demand): All expressed in EUR million, these indicators are defined by formula (4, 5 and 6), with country  $c$ 's total gross exports for a given industry  $i$  directly calculated by summing exports in intermediate goods and services  $EXGR\_INT_{c,i,p}$  and exports of final demand goods and services  $EXGR\_FNL_{c,i,p}$ . The TiVA input-output tables provide detailed information about these exports by industry and partner country. These indicators encompass cross-border flows and direct expenditures by non-residents on the domestic territory. These indicators are essential for understanding a country's participation in global supply chains and its export structure. EXGR represents a country's total gross exports for a specific industry. EXGR\_INT captures the exports of intermediate goods and services used in the production processes of other industries, while EXGR\_FNL encompasses exports of goods and services for final consumption. These indicators allow policymakers and analysts to assess an industry's export orientation and its role in global value chains.

$$EXGR_{c,i} = \sum_p EXGR_{c,i,p} = \sum_p (EXGR\_INT_{c,i,p} + EXGR\_FNL_{c,i,p}) \quad (4)$$

$$EXGR\_INT_{c,i,p} = GRTR\_INT_{(c-1)*N+i,p} \quad (5)$$

$$EXGR\_FNL_{c,i,p} = GRTR\_FNL_{(c-1)*N+i,p} \quad (6)$$

IMGR (Gross Imports), IMGR\_INT (Gross Imports of Intermediates), IMGR\_FNL (Gross Imports of Final Demand): All expressed in EUR million, these indicators are described in formula (7, 8 and 9).  $IMGR\_INT_{c,i,p}$  represents gross imports of intermediates by country  $c$  from industry  $i$  in country  $p$ , while  $IMGR\_FNL_{c,i,p}$  denotes gross imports of final demand goods and services. These indicators are equally crucial for understanding a country's import structure and its reliance on foreign inputs. IMGR represents a country's total gross imports for a specific industry. Like EXGR, IMGR is calculated by summing imports of intermediate goods and services (IMGR\_INT) and imports of final demand goods and services (IMGR\_FNL). TiVA input-output tables provide detailed data on these imports by industry and partner country. IMGR\_INT captures the imports of intermediates used in the production processes of other industries, while IMGR\_FNL encompasses imports of goods and services for final consumption. These indicators help assess an industry's dependence on foreign inputs and its integration into global value chains.

$$IMGR_{c,i} = \sum_p IMGR_{c,i,p} = \sum_p (IMGR\_INT_{c,i,p} + IMGR\_FNL_{c,i,p}) \quad (7)$$

$$IMGR\_INT_{c,i,p} = GRTR\_INT_{(p-1)*N+i,c} \quad (8)$$

$$IMGR\_FNL_{c,i,p} = GRTR\_FNL_{(p-1)*N+i,c} \quad (9)$$

BALGR (Gross Trade Balance): Expressed in EUR million, this indicator, described in formula (10), signifies the difference between Gross exports  $EXGR_{c,p}$  and Gross imports  $IMGR_{c,p}$ . It is provided for country  $c$  and partner  $p$  for the total industry. This indicator reflects the difference between a country's gross exports (EXGR) and gross imports (IMGR) for a specific industry and partner country. It provides insights into whether an industry within a country a net exporter or importer in its trade relationship with a specific partner is. A positive BALGR indicates a trade surplus, while a negative value suggests a trade deficit. By examining BALGR for different industries and partners, analysts can identify areas of trade strength or vulnerability within the economy.

$$BALGR_{c,p} = EXGR_{c,p} - IMGR_{c,p} \quad (10)$$

EXGRpSH (Gross Exports, Partner Shares): This indicator, expressed as a percentage, is depicted in formula (11). It calculates the partner shares for each country, industry, and partner country by dividing the total exports of the industry and country by the specific export

of that industry and country. The industry in this context refers to the exporting industry. This percentage-based indicator allows for a more detailed analysis of a country's export structure. In the TiVA framework, it leverages the data from EXGR, EXGR\_INT, and EXGR\_FNL. EXGRpSH offers insights into which industries and partner countries play a significant role in a country's export portfolio. High values may indicate strong export relationships with specific partners, while low values suggest less concentration.

$$EXGRpSH_{c,i,p} = \frac{EXGR_{c,i,p}}{\sum_p EXGR_{c,i,p}} * 100 \quad (11)$$

IMGRpSH (Gross Imports, Partner Shares): Also expressed as a percentage, this indicator, described in formula (12), computes the partner shares in a similar manner to EXGRpSH, yet focusing on gross imports. It is calculated for each country, industry, and partner country. IMGRpSH provides insights into the sources of a country's imports and helps identify key partner countries for specific industries. High values suggest significant import relationships with specific partners, while low values indicate less reliance.

$$IMGRpSH_{c,i,p} = \frac{IMGR_{c,i,p}}{\sum_p IMGR_{c,i,p}} * 100 \quad (12)$$

### *Phase 3: Data Processing and Analysis*

In this phase, we organized and processed the data obtained from our selected information sources. We designed a robust statistical framework for data manipulation and conducted comprehensive analyses. Leveraging scalar procedures and employing descriptive and inferential statistical techniques, we probed deeply into the dataset to extract meaningful insights. Data processing was proficiently executed using software from the Microsoft suite. This encompassed the creation of primary databases and the generation of charts and tables that present our research findings with statistical rigor.

For our analytical endeavors, we embraced the input-output framework, renowned for its efficacy in exploring intricate economic interdependencies. We particularly homed in on the multiregional model, a powerful tool for unraveling trade dynamics among diverse countries and economic sectors. Our examination of Spain's export sector drew upon various methodological approaches (early described) and data sources.

The empirical inter-country-trade literature widely recognizes the value of these methodological approaches and data sources for mapping and quantifying Spain's export sector at the sectoral level. In this study, they served as indispensable tools for elucidating the intricate dynamics of trade and production, both at the national and international scales.

### **III. Results and Discussion: Analyzing Spain's Global Value Chains and Trade Dynamics**

In this section, we explore into the results and discussions stemming from our analysis of Spain's involvement in global value chains (GVCs) and its trade dynamics with a focus on key regions and major trading partners. This segment of the research report will be structured into two sub-parts, each dedicated to examining specific groups of indicators, all in accordance with the methodological and conceptual guidelines discussed throughout this investigation.

The first sub-part will provide an overview of Spain's participation in global value chains, as reflected by indicators such as PROD, VALU, PROD\_VASH, EXGR, IMGR, and BALGR. We will explore the extent to which Spain contributes to the value added in its exports, the value of its imports, and its trade balances with different regions and trading partners.

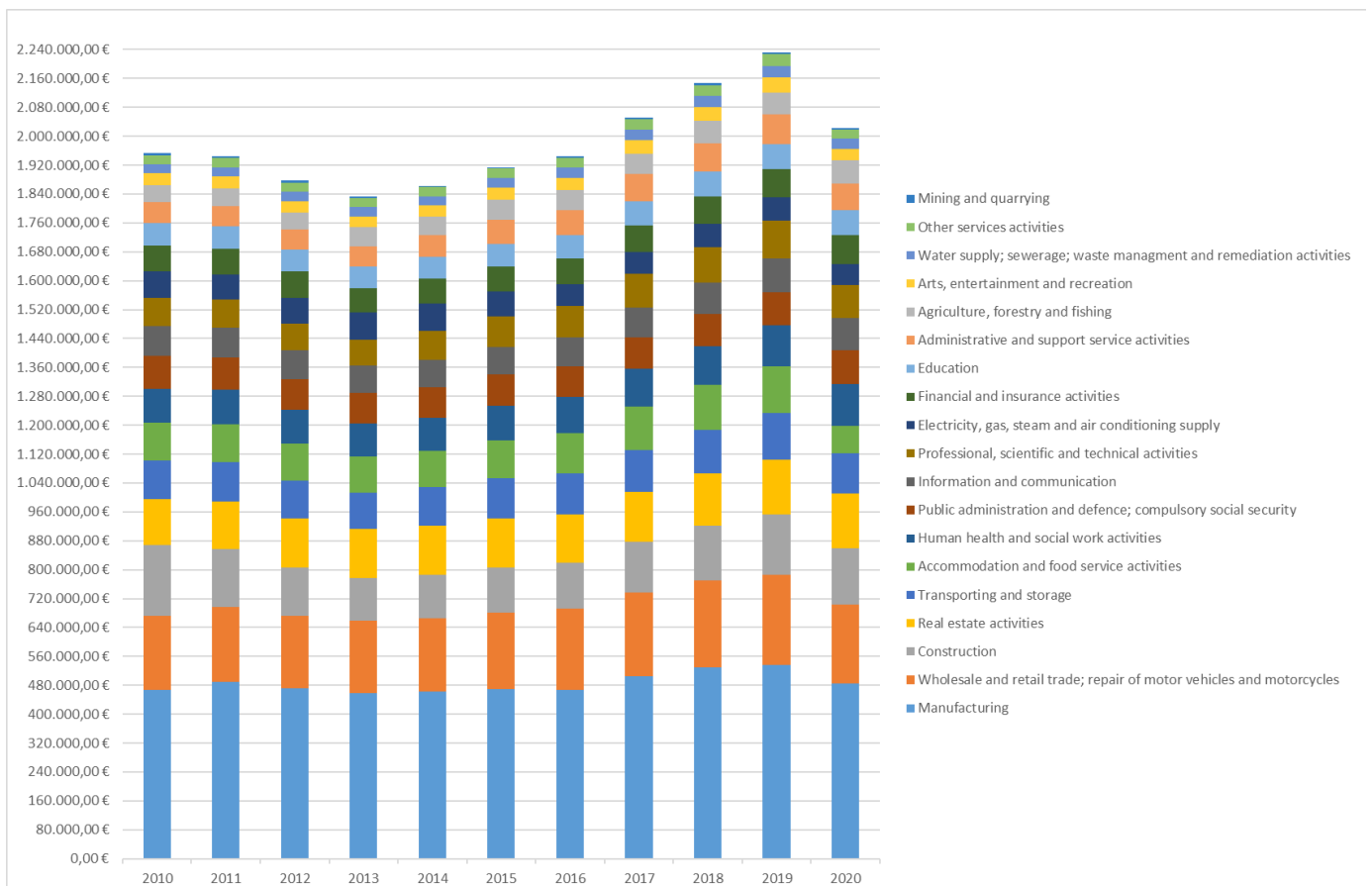
Sub-part 3.2 will delve into indicators EXGRpSH and IMGRpSH, which assess Spain's trade intensity and competitiveness in specific sectors. We will analyze how Spain's exports and imports are distributed among its major trading partners and regions and evaluate its relative position in terms of domestic value-added content.

Throughout these sub-parts, we will engage in a comprehensive discussion of the findings, considering the economic implications, policy insights, and prospects for Spain's integration into global value chains and its trade relations with key regions and partners.

#### *Sub-Part 3.1: Spain's Role in Global Value Chains*

**PROD (Production):** The manufacturing sector emerges as the largest contributor to Spain's production during the study period (2010-2020), starting at €467,070.19 million in 2010 and peaking at €535,992.45 million in 2019. However, the sector experienced a setback in 2020 due to the COVID-19 pandemic, returning to values like those observed in 2010 and 2011. The wholesale and retail trade sector follows, with its best year in 2019, exhibiting gradual growth since 2014, reaching a peak of €249,460.96 million. The construction sector faced challenges after 2011 but began to recover in 2017-2018, returning to pre-2008 crisis levels. Other sectors, such as Real estate activities, transporting and storage, and accommodation and food service activities, experienced fluctuations, with the latter contracting significantly in 2020 due to the pandemic. Overall, 2019 marked the highest production value in the series, reaching €2,242,444 million. Total production exhibited a slowdown from 2010 to 2013, hitting a low point of €1,842,058.341 million, followed by a rapid ascent until the peak in 2019, followed by a decline in 2020 due to the COVID-19 impact.

Figure 6. Total Output, million euros.



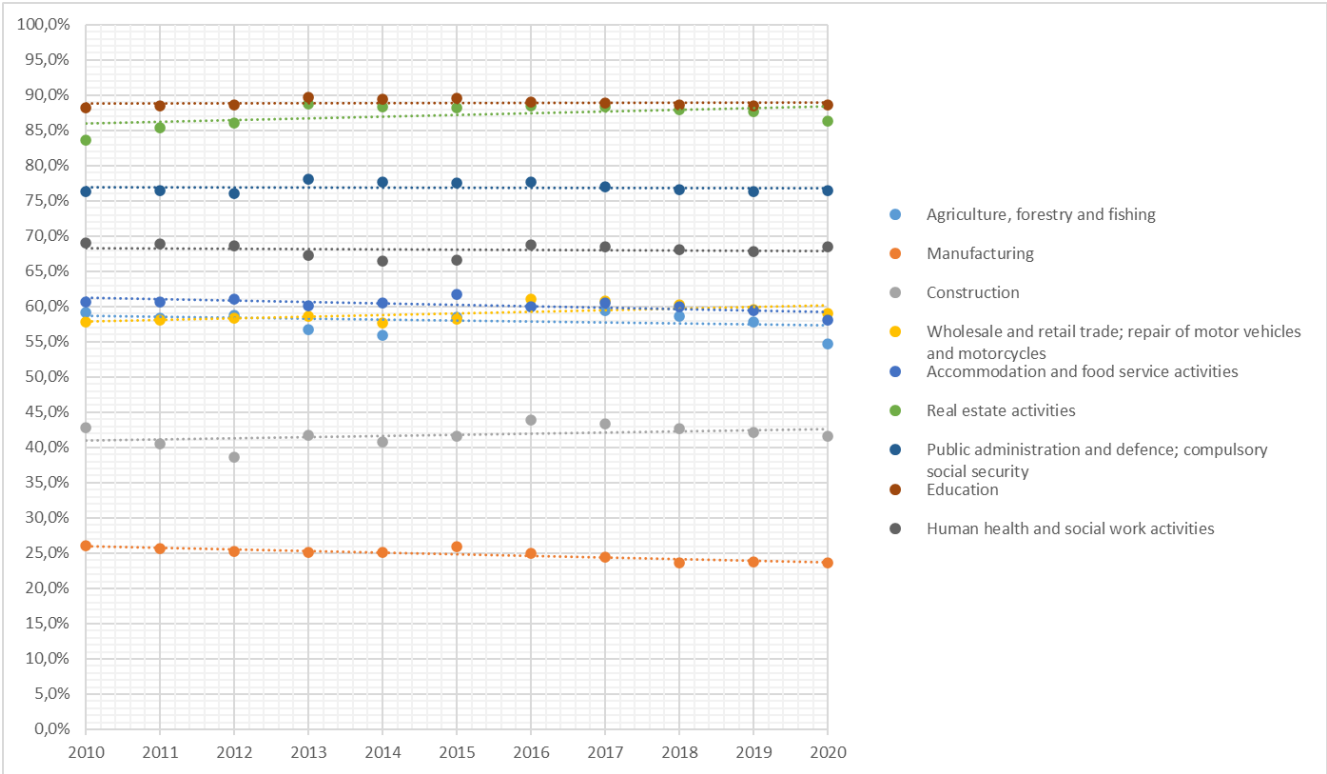
Source: Own elaboration.

Sectors with a strong focus on services exhibited gradual growth throughout the series. These include information and communication, professional scientific and technical activities sector, financial and insurance activities, education, administrative and support services, and arts, entertainment, and Arts and entertainment. These sectors collectively accounted for 53% of total production by 2019. Sectors that remained resilient in 2020 despite the pandemic included agriculture, forestry, and fishing, public administration and defence, education, public health, and social work activities. The finance and insurance sector, after a decline between 2010 and 2013, resumed continuous growth, even in 2020 despite the pandemic.

EXGR (Exports): When analyzing export structures by region, there is a notable growth in export volume to the European Union (EU) over the entire series, except for slight setbacks in 2012, 2014, and between 2018 and 2019. However, exports to the EU fell in 2020 due to the pandemic, returning to values seen before 2017. A breakdown by intermediate consumption, final domestic consumption, and demand from other destinations (such as changes in valuables and inventories and gross fixed capital formation) reveals significant growth in intermediate (consumption) exports to the EU. For non-European OECD members, export volumes exhibit

cyclic patterns, with periods of growth and decline every three years. Exports of intermediate (consumption) goods account for more than 50% of exports to these regions.

Figure 7. Value Added, by industry, percent.

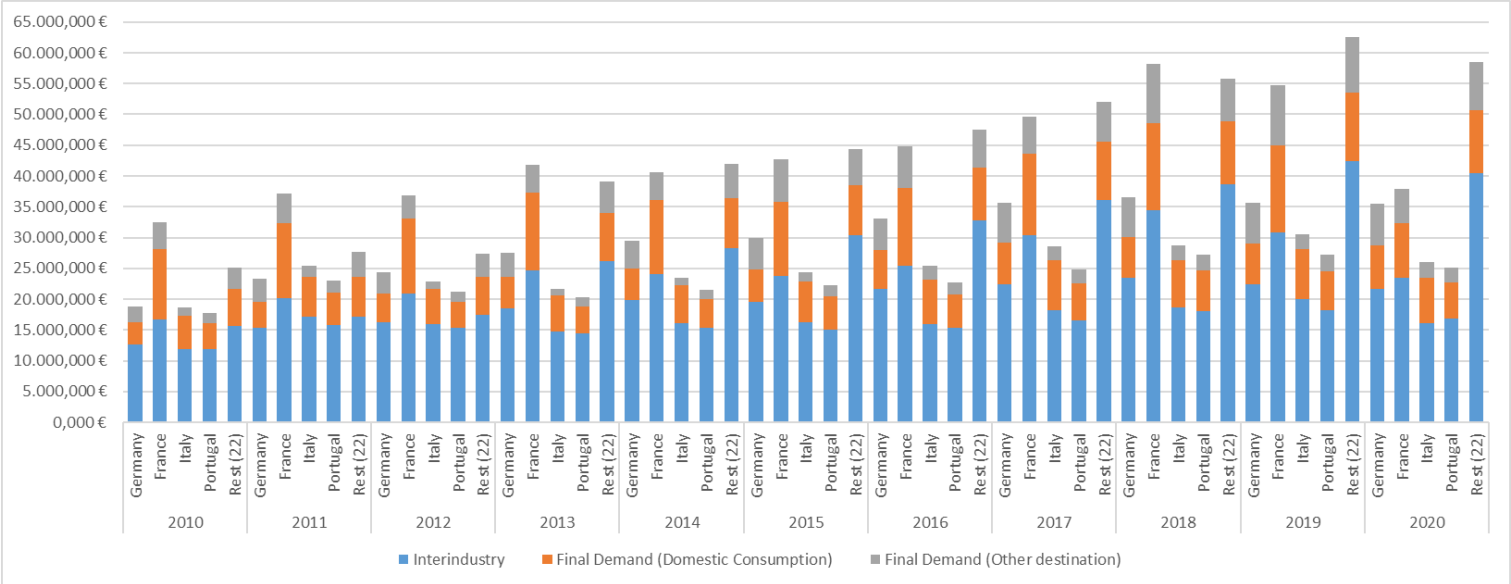


Source: Own elaboration.

Exports to Key EU Partners: Exports to key EU partners, including Germany, France, Italy, and Portugal, demonstrate interesting dynamics. France stands out as the primary destination for Spanish exports in terms of volume, primarily intermediate (consumption) exports. Although there was a slight contraction in inter-industry exports to France between 2013 and 2014 and again in 2019, exports destined for final consumption in France have been steadily increasing. Germany has also solidified its position as a key destination, surpassing Italy in 2010 and maintaining that position throughout the period. Most of Spain's exports to Germany fall under inter-industry consumption, exceeding €20,000 million in 2018, the peak year. Exports destined for final consumption have also seen moderate growth. Similar patterns are observed with Italy and Portugal, with intermediate (consumption) exports consistently exceeding €15,000 million since 2015. During this period, other EU-22 countries have also become significant export destinations, with both intermediate consumption and final consumption exports showing growth since 2010.

Exports to Other OECD Members: Exports to other strategic partners, namely the United Kingdom, Switzerland, the United States, Russia, and China, are examined. The United States has consistently been the top destination outside the EU for Spanish exports since 2010, reaching its highest point in 2018, surpassing €22,500 million. Most exports to the United States are trade in for final demand (specifically for Gross Fixed Capital Formation and Changes in valuables and inventories). Periodically, intermediate (consumption) exports to the United States also grow, exceeding €7,500 million in certain years. The United Kingdom follows, with periods of both growth and decline. While it does not surpass the United States in total export volume, the United Kingdom is the primary destination for intermediate (consumption) exports throughout the series. Starting in 2016, China became the second largest destination for Spanish exports outside the EU, with a significant focus on intermediate consumption, exceeding €7,500 million.

Figure 8. European Union – partners trade, million euros



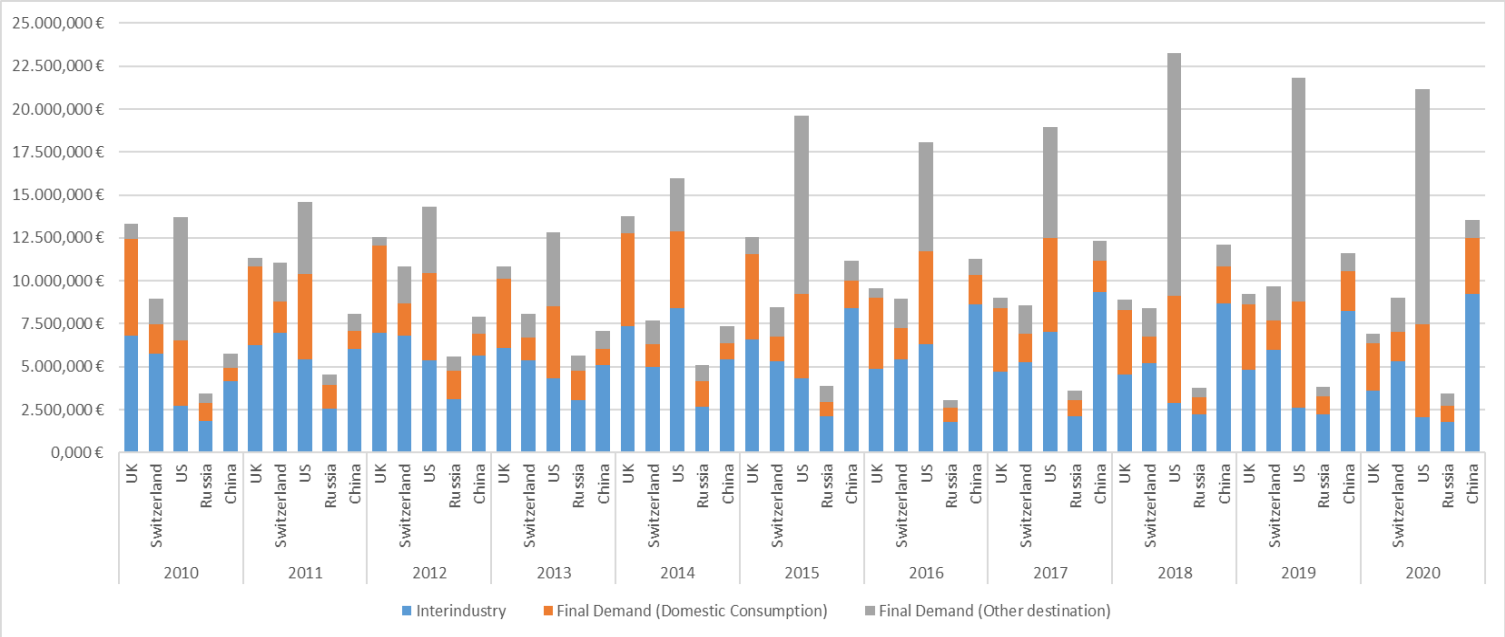
Source: Own elaboration.

Switzerland has become the fourth destination, following the rise of China. The balance between exports destined for intermediate consumption and final demand varies over the years. Finally, Russia's importance in the geopolitical scenario leads us to include it in the analysis. Exports to Russia fluctuate between €2,500 million and €5,000 million, with recent reductions, mainly due to a deficit in the trade balance. The deficit is driven by high imports of inter-industry goods, which reduced between 2013 and 2017 when a trade surplus was achieved.

BALGR (Budgetary Balance): Notably, Spain's trade balance throughout this period has experienced more surplus years than deficit years, with deficits occurring between 2010 and

2012 and again from 2018 to 2019. The most significant deficit was recorded in 2010, at -€36,946.245 million, while the largest surplus was achieved in 2013, at €9,667.257 million. The specific balance for inter-industry consumption has consistently been in deficit every year in the series, with the largest deficit occurring in 2010 at -€43,487.708 million. During surplus years in the overall trade balance, there was a deficit in intermediate consumption due to high imports, but exports destined for final consumption exceeded imports.

Figure 9. Regional trade, million euros



Source: Own elaboration.

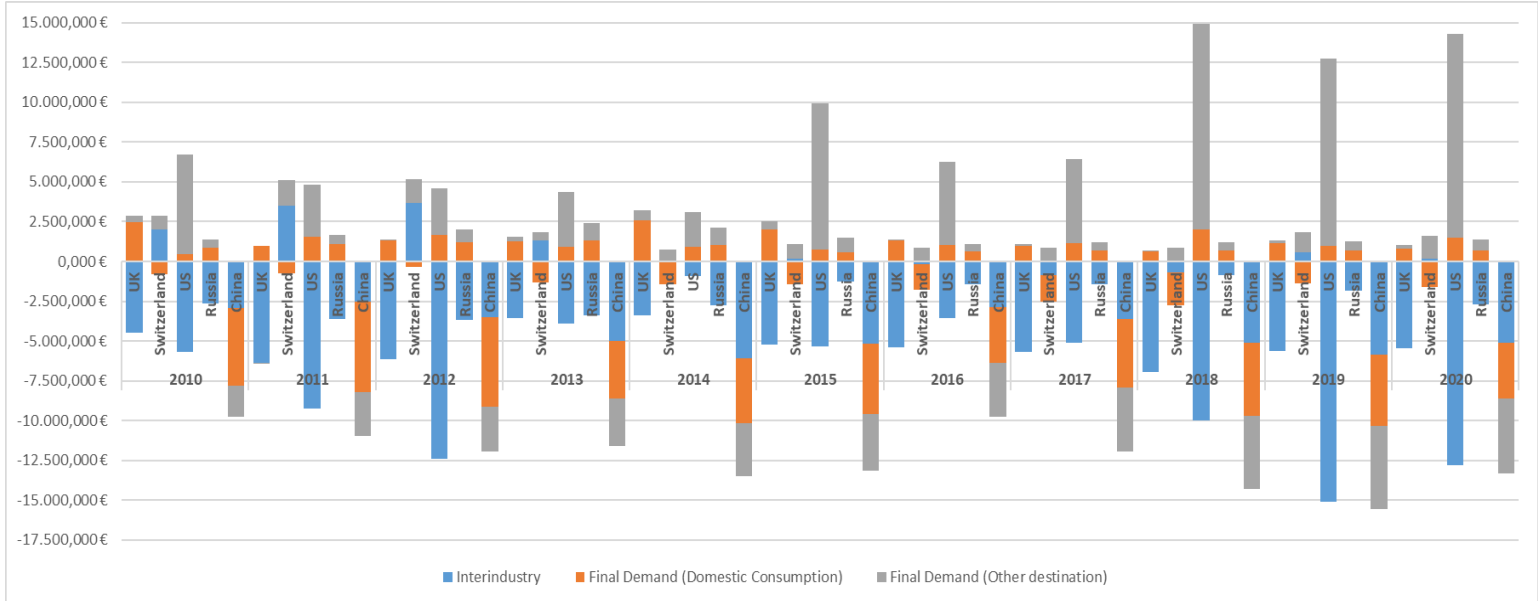
A regional analysis of this TiVA indicator reveals a negative balance with non-European OECD countries, indicating high imports of intermediate goods from these destinations, which decreased between 2013 and 2017 when a surplus was achieved. In the case of the European Union, two distinct periods can be observed: one before 2010, marked by a consistently negative balance, and one from 2011 onwards when the balance turned positive, particularly for inter-industry consumption. This region became the primary destination for Spanish inter-industry exports, and it also began to see a positive balance for final demand, which predominantly trends towards surplus.

Imported Content of Exports: The imported content of exports has been traditionally used as an indicator of vertical specialization (Hummels et al., 2001) and, more recently, of participation in global value chains through the transformation of intermediate goods for sale in foreign markets. The high and increasing penetration of imports in exported goods reflects the progressive integration of the Spanish economy into international production fragmentation



processes. Spain has not been immune to this trend, which gained momentum in the mid-1990s, fostering the global trade of intermediate goods.

Figure 10. OECD – partners budgetary balance, million euros



Source: Own elaboration.

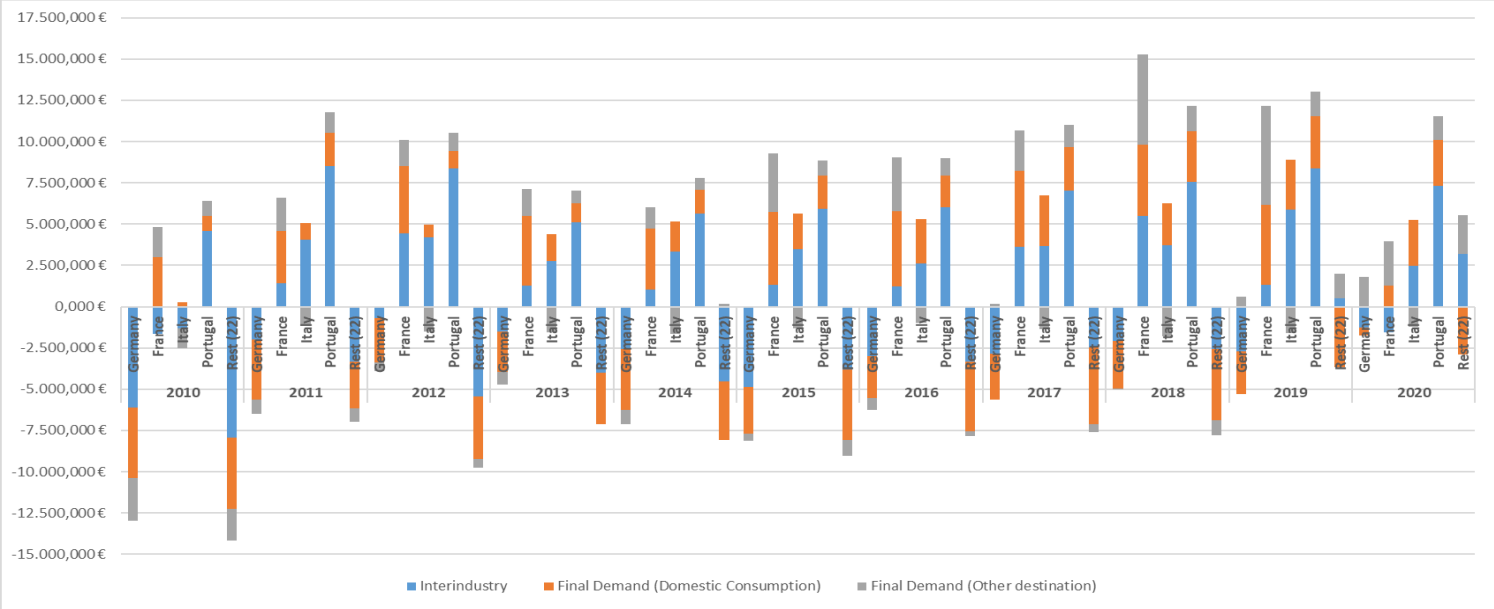
The internationalization of production processes received a significant boost during this period, leading to increased trade in intermediate goods, which grew at higher rates than other goods as global production chains expanded geographically. Spain's integration into this vertical specialization process is consistent with that of other advanced and emerging economies, resulting in an increase in its vertical specialization. In line with Gandoy (2019), intermediate imports emerge as a key element of competitiveness. Through these imports, companies benefit from the transfer of advanced technologies and obtain higher-quality inputs at competitive prices. The resulting specialization leads to more efficient use of productive resources, promoting productivity improvement.

Imported Content of Exports with EU's Major Trading Partners: The high imported content of industries with a strong technological focus is primarily due to the substantial dependence on foreign inputs in the manufacturing of motor vehicles, amounting to 46% in 2011. This reliance reflects the participation of Spanish-based companies in vertical specialization processes characteristic of this sector.

Spain's significance in automobile production and export, with assembly plants for major European, American, and Japanese automotive brands (Volkswagen, Renault, Ford, Nissan), explains the high dependence on imported intermediate inputs. While the Spanish industry has developed a robust auxiliary sector, its specialization in final assembly sets it apart

from economies like Italy or Germany, which are more oriented toward providing parts and components for transformation and assembly in cost-advantageous countries, resulting in less dependence on foreign supplies.

Figure 11. European Union – partners budgetary balance, million euros



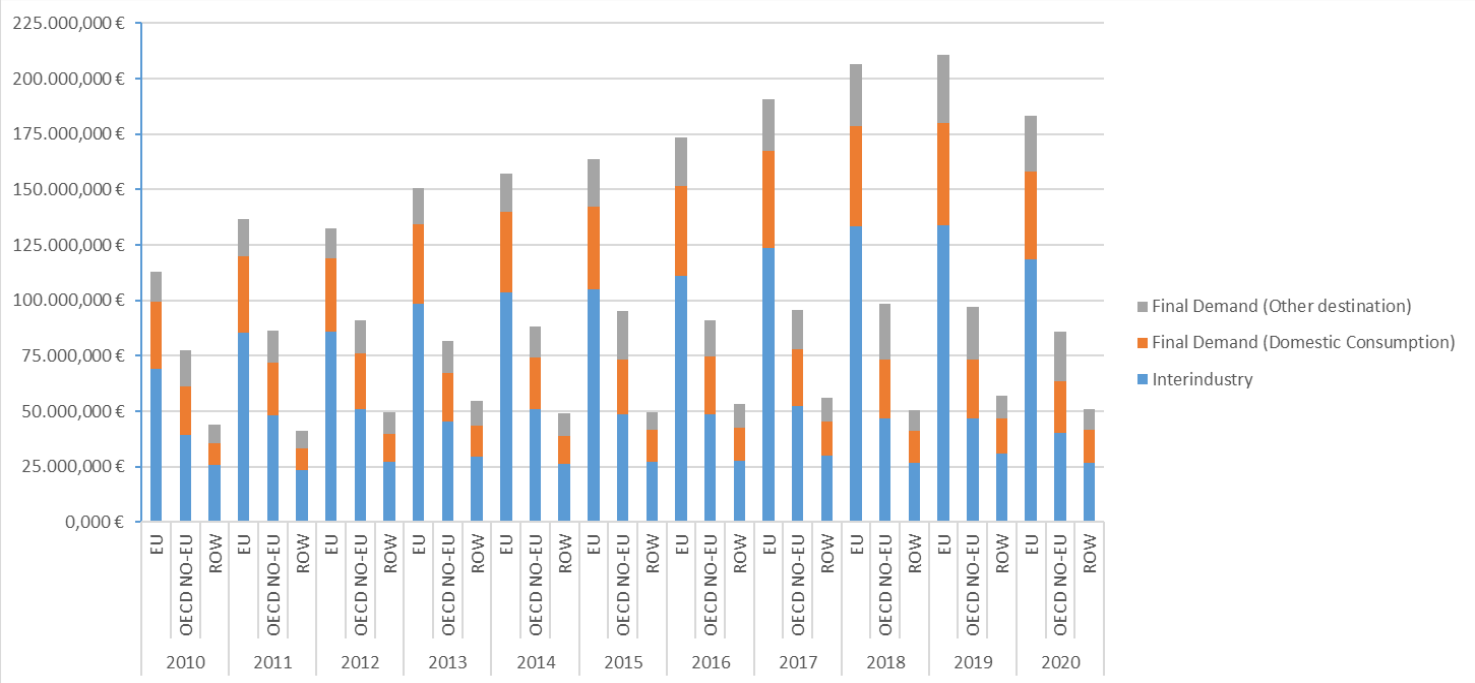
Source: Own elaboration.

This association between import dependency and vertical specialization, led by foreign capital, finds theoretical support in Antràs (2003), which demonstrates that how companies organize the internationalization of production processes and acquire external inputs (through markets or intra-firm trade) is not independent of the factor intensity of the required inputs. In sectors relatively more capital, technology, and knowledge-intensive, companies tend to vertically integrate their internationalized production processes because it allows them better control over quality, requirements, and investment needs.

Budgetary Balance with Major EU Trading Partners: When examining the BALGR indicator with key EU trading partners, distinctive patterns emerge. With Germany, the trade balance initially exhibited deficits in both inter-industry consumption and final demand during the early years of the period (2010 to 2017). From that point onwards, the deficit in intermediate consumption began to decrease, although imports from Germany also increased. However, exports to Germany increased at a similar pace, resulting in the first surplus in the trade balance with Germany in 2020. In contrast, the trade balance with France generally maintained a surplus, except for 2020. Despite growing imports from France, the trade balance remained positive, mainly due to exports destined for domestic final consumption, which exceeded €10,000 million in 2018. Portugal and Italy also maintained trade surpluses for most years, with

the surplus increasing significantly from 2017. Portugal's surplus exceeded €10,000 million in 2020.

Figure 12. Exports by region, million euros



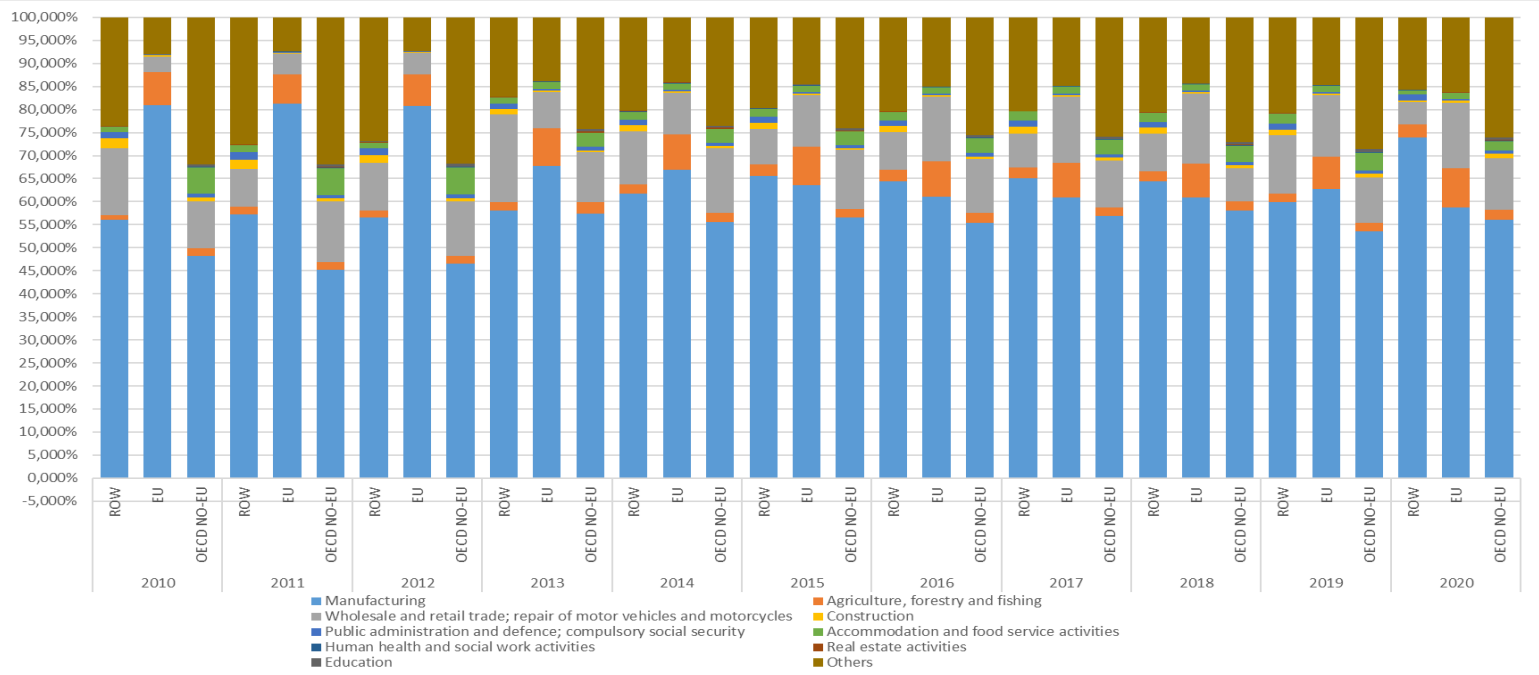
Source: Own elaboration.

Budgetary Balance with Major OECD Trading Partners: For non-European major trading partners, the trade balance remains primarily in deficit throughout the period, except for surpluses in 2015 and 2018 with Russia. In the case of the United States, a positive trade balance has been maintained since 2013, despite significant imports of inter-industry goods. In contrast, exports to China consistently lag imports for both final demand and intermediate consumption. The United Kingdom consistently exhibits a trade deficit throughout the period, with the largest deficit recorded in 2018 at -€6,253.444 million, primarily driven by inter-industry consumption imports. Russia's trade balance fluctuates, with most years showing a deficit, except for 2015 and 2018 when surpluses were achieved. Deficits mainly result from imports for intermediate consumption, ranging from €3,000 million to €6,500 million.

These findings highlight Spain's evolving role in global value chains, with a strong presence in sectors like manufacturing and construction. Moreover, the imported content of exports underscores the country's integration into international production processes. Spain's trade balances with different regions and partners also reveal distinctive patterns, with a transition to surplus balances in recent years with certain EU and non-European OECD members.

France: France emerged as Spain's primary export destination within the EU, especially for inter-industry consumption. The export dynamics indicate strong economic ties between the two countries. Despite minor contractions in certain years, exports to France continued to grow, highlighting the importance of this partnership. Spain's ability to supply intermediate goods to France for further processing showcases their role within the global value chain.

Figure 13. Exports by industry in each region, percent



Source: Own elaboration.

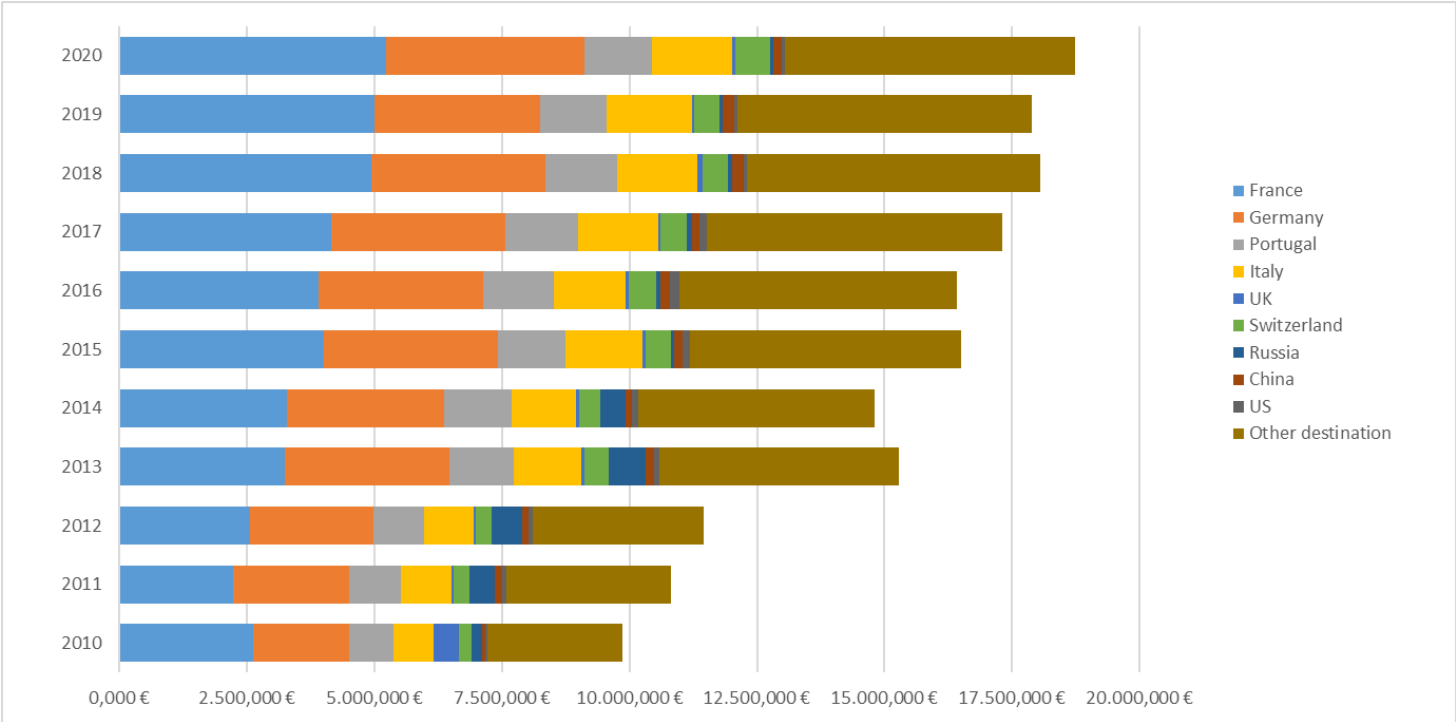
Germany: Germany became Spain's second-largest export partner within the EU, surpassing Italy in 2010. The majority of exports to Germany consisted of inter-industry consumption, indicating a close economic relationship. Spain's capacity to provide Germany with intermediate goods suggests a complementary role within the production processes of both countries.

United Kingdom: While the UK was a significant export destination for Spain, the trade balance consistently showed deficits. Spain's exports to the UK, particularly inter-industry consumption, highlight its role in supplying intermediate goods for the UK's manufacturing sector. However, the trade balance deficits may indicate the UK's ability to capture more value-added in the production chain.

China: China emerged as one of Spain's major trading partners outside the EU, emphasizing Spain's global reach. The focus on inter-industry consumption in exports to China implies that Spain plays a crucial role in China's global value chains, supplying necessary

intermediate goods. This partnership reflects Spain's position as a participant in global production networks.

Figure 14. Agriculture, forestry, and fishing (major partners – trade), million euros



Source: Own elaboration.

United States: The United States became Spain's primary destination outside the EU, with Spain exporting a significant portion of goods for final demand, particularly in the category of Gross Fixed Capital Formation and Changes in valuables and inventories. This suggests that Spain contributes to the US economy's investment and capital needs. The trade surplus with the US indicates Spain's competitive advantage in certain sectors.

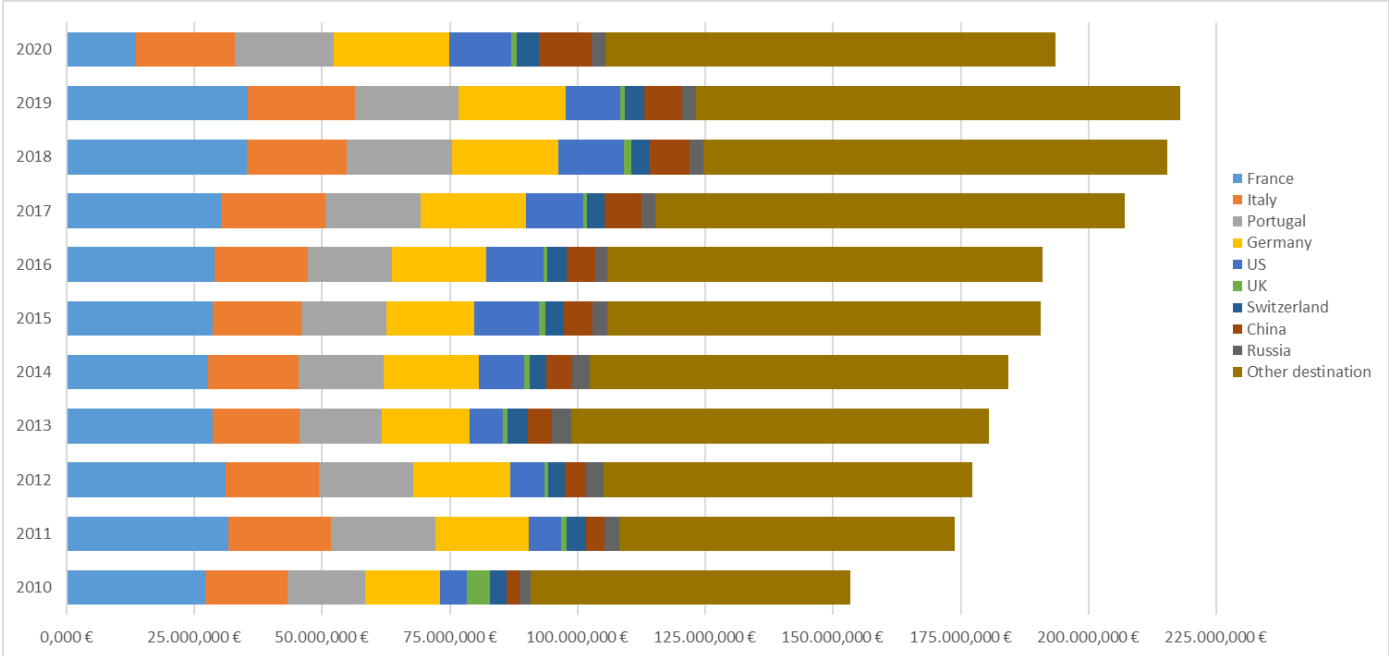
Switzerland: Spain's trade relationship with Switzerland indicates a balance between inter-industry consumption and final demand. Spain supplies Switzerland with intermediate goods, emphasizing its role in the Swiss production process. The consistent trade balance with Switzerland demonstrates the stability of this partnership.

Russia: Spain's inclusion of Russia in its analysis underscores the geopolitical significance of this trade relationship. While exports to Russia fluctuated, Spain maintained a trade balance. This relationship may involve energy resources or other strategic goods, highlighting the complexity of international trade dynamics.

EU and Non-European OECD Countries: Spain's trade balances within the EU and with other OECD countries demonstrate its central role in global value chains. Spain's ability to

provide intermediate goods to these regions underscores its position in international production processes. Additionally, the transition from consistent trade deficits to surpluses with these regions suggests that Spain's exports are becoming more competitive in various sectors.

Figure 15. Manufacturing (major partners – trade), million euros



Source: Own elaboration.

Backward and Forward Participation in GVCs:

Backward Participation: Spain's role as a supplier of intermediate goods to countries like France, Germany, and the UK demonstrates its backward participation in GVCs. The export of intermediate goods implies that Spain contributes to the early stages of production processes in these countries.

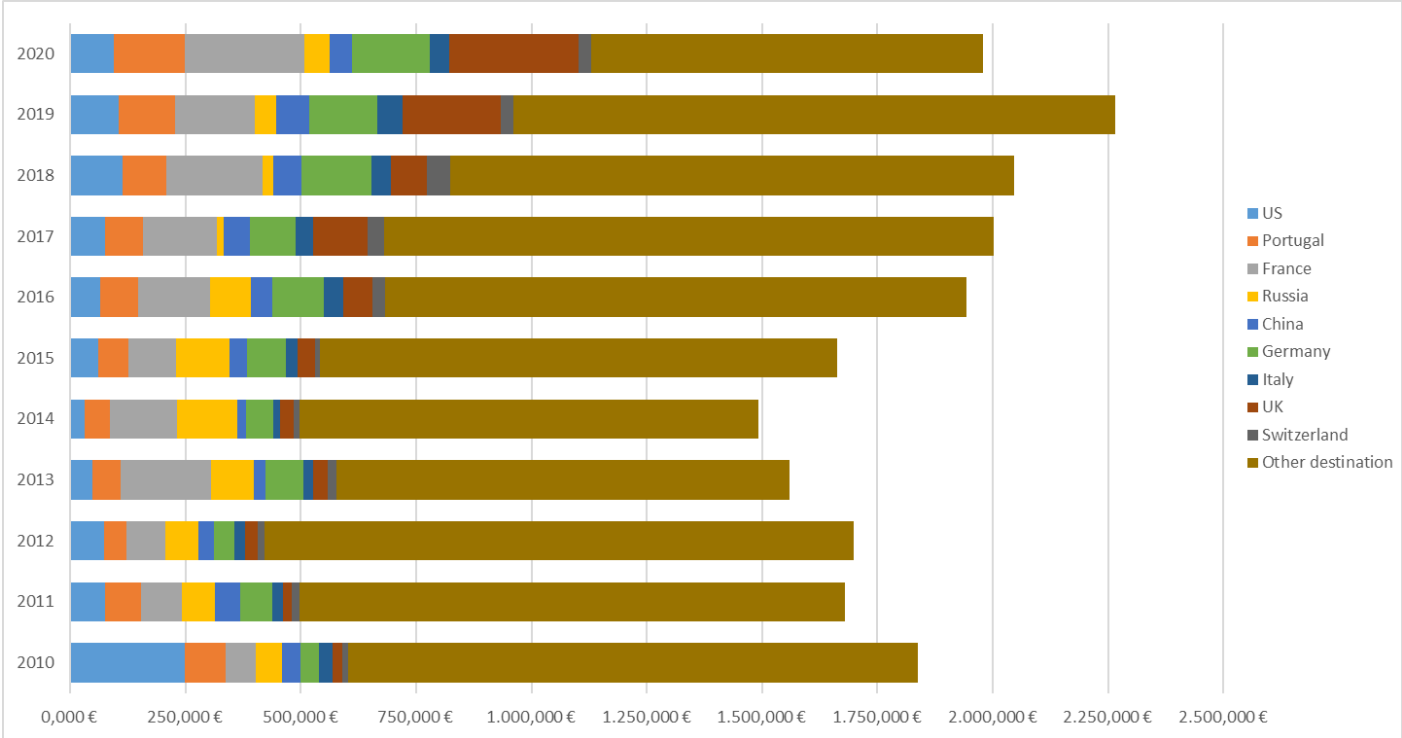
Forward Participation: Spain's export of goods for final demand to the United States highlights its forward participation in GVCs. These exports, especially those categorized under Gross Fixed Capital Formation and Changes in valuables and inventories, suggest that Spain is involved in the later stages of production and serves as a source of final goods for the US market.

In conclusion, Spain's role in global value chains is evident through its export patterns and trade dynamics with various countries and regions. It serves as a key supplier of intermediate goods, contributing to the production processes of its trading partners. These economic relationships are central to understanding Spain's position in the global economy and its participation in international production networks.

*Sub-Part 3.2: Spain's Trade Intensity and Competitiveness*

To analyze exports during the observed period, we focused on sectors contributing significantly, accounting for over 80% of annual exports. These sectors are pivotal for Spain's external economy due to its position in Global Value Chains (GVCs) and their global development. Within the EU, where Spanish exports are concentrated, manufacturing dominates, accounting for over 55% of total exports to the region. This sector also holds substantial importance, exceeding 45%, for countries in other regional groups. The wholesale and retail trade sector, on the other hand, has been steadily growing since 2014, contributing over 10% to Spain's exports to the EU and non-European OECD member countries.

Figure 16. Construction (major partners – trade), million euros



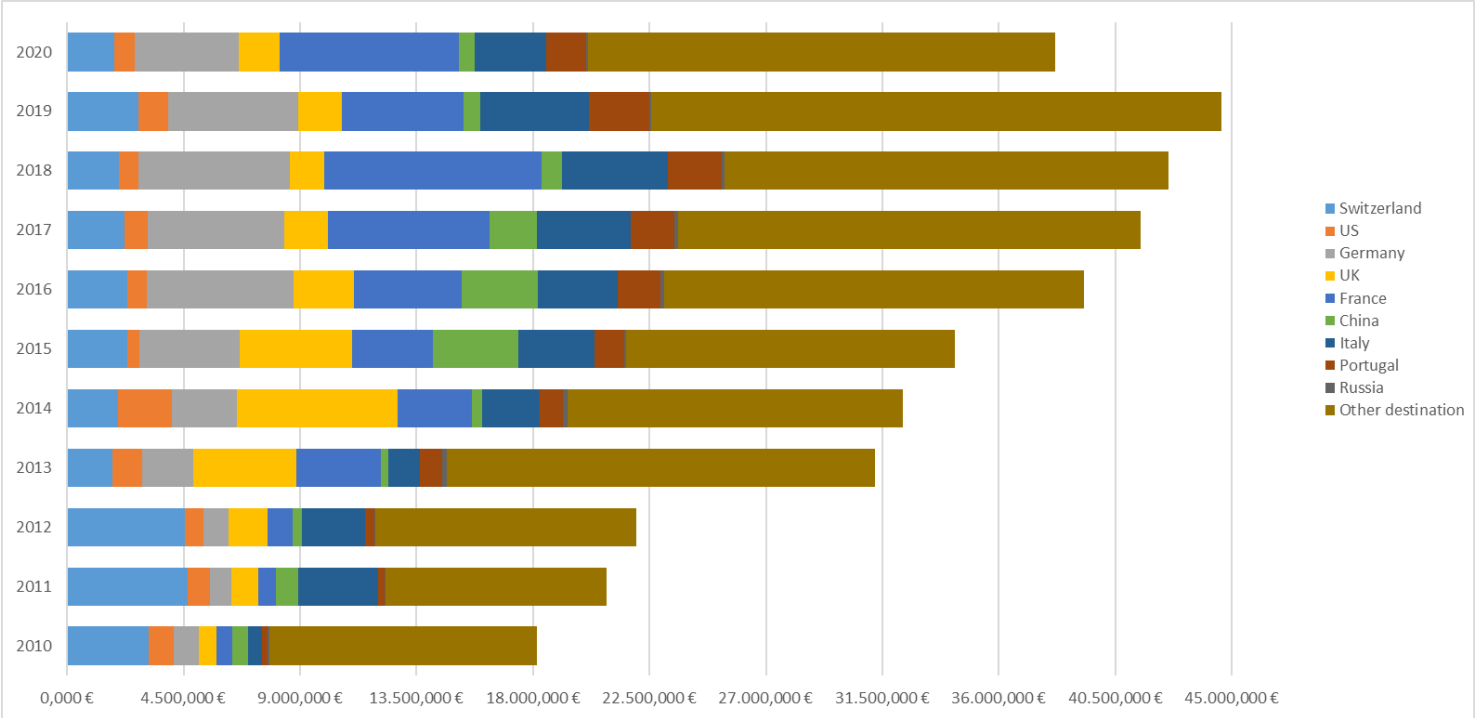
Source: Own elaboration.

The sector of accommodations and food services, while experiencing volume growth, maintains a smaller share in the export structure. Agriculture, forestry, and fishing exports are significant within the EU, while construction gains prominence in exports to the Rest of the World. Other sectors, as shown in the figure 18, hover below 1% in most cases, with real estate activities falling in the 1% to 3% range.

We aimed to determine the relative importance of commercial ties with specific partners within various sectors. In Agriculture, Forestry, and Fishing, French demand led, surpassing €5 million in 2020. Germany ranked second, reaching its peak in 2013, constituting 11.6% of total

exports to Germany. Portugal and Italy followed, with over 50% of sector exports directed within the EU. Outside the EU, the United Kingdom and Switzerland played strategic roles.

Figure 17. Wholesale and retail trade (major partners – trade), million euro



Source: Own elaboration.

Within Manufacturing, Spanish firms, according to Juste et al. (2016), focus on stages involving transformation and assembly of intermediate inputs, due to integration into global value chains. France consistently dominated, surpassing €25 million in most years, though 2020 saw a shift to Italy, Portugal, and Germany due to the pandemic. These four countries import over 40% of Spanish industrial exports, with the United States also increasing interest. China became a significant market in 2019, representing 75.8% of Spain's exports.

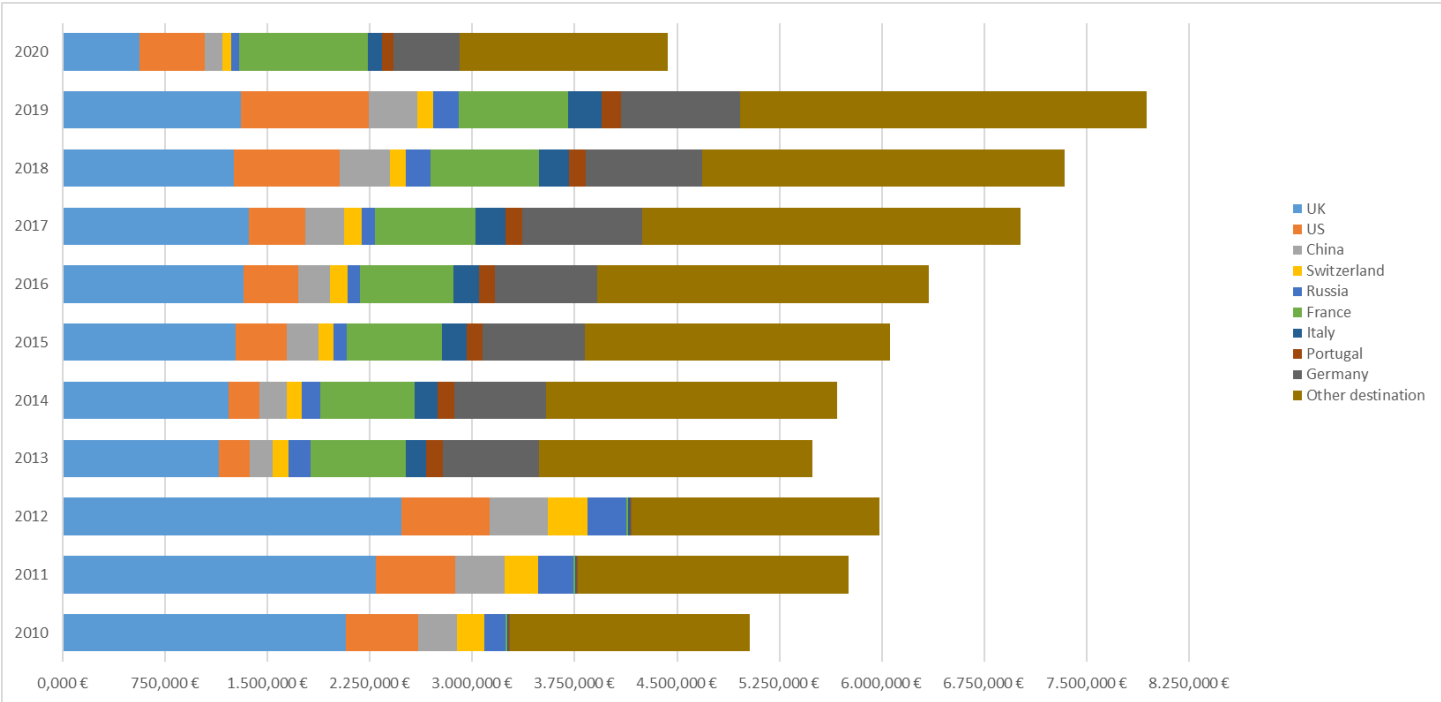
In the Construction sector, international destinations outside the EU dominated until 2019, with the United States leading until 2010, later replaced by France, followed by the United Kingdom, Portugal, and Germany. Russia had a significant presence from 2010 to 2016.

The Wholesale and Retail Trade sector, alongside motor vehicle and motorcycle repair, plays a crucial role in Spain's foreign trade. In this sector, primary partners account for over 50% of exports, with France becoming the primary destination in 2013. Germany also plays a vital role, notably increasing imports. Together with Switzerland and Italy, they monopolize sector exports, representing between €18 million and €22.5 million in exports. For these



countries, the sector accounts for between 6% and 17% of Spain's total exports, exceeding 20% for Switzerland.

Figure 18. Accommodation and food service activities (major partners – trade), million euro



Source: Own elaboration.

In contrast, sectors such as Accommodation and Food Service Activities, Real Estate Activities, Public Administration and Defense, Compulsory Social Security, Education, and Human Health and Social Work Activities see primary export destinations outside the EU. France and Germany have gained increasing relative importance within these sectors. The Accommodation and Food Service Activities sector, highly dynamic within Spain's economy, primarily exports to the United Kingdom and the United States, with France and Germany gaining importance.

The remaining sectors each represent less than 3% of exports to analyzed countries but are characterized by high productivity levels, either as inputs for other sectors or directed at domestic final demand. These sectors exhibit discrete values of relative importance in exports to primary partners.

Differences between countries partly reflect disparate production and export structures, notably in the participation of imported inputs, which is considerably higher in goods exports compared to services, especially in sectors like textiles, automotive, chemicals, and pharmaceuticals.

## Key Milestones

**Importance of Manufacturing:** The manufacturing sector emerges as the most crucial in Spain's exports. It represents over 55% of total exports to the European Union (EU), underscoring its significance in the country's competitiveness. Additionally, this sector exhibits a notable import dependency in its exports, indicating integration into global value chains (GVCs).

**Growth in Wholesale and Retail Trade:** Starting in 2014, the wholesale and retail trade sector has been experiencing steady growth as a part of Spain's exports to the EU. It now surpasses 10% of total exports to this region. This sector also accounts for more than 10% of total exports to non-European OECD countries since 2015.

**Accommodation and Food Services:** Despite an increase in volume, this sector's share of the export structure is relatively low, particularly concerning non-European OECD countries. However, it plays a more significant role in exports to EU regions.

**Agriculture, Forestry, and Fishing:** This sector holds more significance in exports to the EU region, showcasing the nature of the exports' proximity to the region.

**Construction Sector:** Many exports from the construction sector are directed to non-European international destinations, although this dynamic has been evolving since 2010. In 2020, France overtook the United States as the leading destination for exports from this sector.

**Wholesale and Retail Trade:** This sector is highly significant for Spain's foreign trade. Major partners receive over 50% of exports, with France being a notable destination since 2013. Germany, Switzerland, and Italy have also become prominent importers of goods from this sector since 2014.

**Other Sectors:** Several sectors, such as real estate activities, public administration and defense, compulsory social security, education, and human health and social work activities, have varying degrees of export intensity. They typically account for less than 3% of exports to individual countries but are characterized by high productivity levels.

The integration of Spanish manufacturing into global value chains is highlighted, as is the growth in exports to both European and non-European OECD countries. Additionally, it points out variations in export structures and the significance of imported inputs in certain sectors, shedding light on Spain's economic dynamics and trade relationships.

## Conclusions

This research sheds light on various crucial aspects and initiates a study on the dynamics of Spain's foreign trade with its key partners. Throughout this section, we will delve into these relevant aspects, which can be synthesized into four (4) key points. These points underscore the relevance, novelty, and the imperative need for further exploration in this study: (1) The utilization of a more comprehensive database with aggregated and standardized values for studying foreign trade dynamics, specifically the FIGARO database, which is currently underutilized; (2) the application of TiVA indicators, which play a pivotal role in understanding the intricacies of global value chains and their impact on Spain's trade dynamics; (3) Spain's participation in global value chains concerning its strategic partners, emphasizing the interdependence and opportunities within these chains; (4) the necessity of implementing a trade policy that includes additional partners, such as those in Latin America, North Africa, and the Gulf region. This policy should enable a favorable positioning for Spain's export and import activities, ultimately enhancing its standing within global value chains. These aspects collectively underscore the significance of this research and highlight its potential to contribute to a deeper understanding of Spain's foreign trade dynamics and its positioning in the GVC.

Methodologically, this discussion highlights the importance of comprehensive frameworks for measuring world value added to gain a more accurate understanding of the intricacies of global value chains. The limitations of previous measurements stemmed from incomplete world value chains, prompting the need for robust conceptual frameworks. This methodological advancement is essential to capture the full scope of value creation and integration in contemporary global trade.

From the theoretical perspective, this study reveals the critical role of services within Global Value Chains (GVCs). The TiVA 2021 database underscores the significance of services, as they accounted for a substantial portion of total exports in major economies such as the United States, China, Germany, France, and Italy. Services have become an increasingly employed channel for enhancing the competitiveness of exports goods??, reshaping the dynamics of international trade. The higher incorporation of services into GVCs marks a fundamental shift in the global economic landscape, emphasizing the importance of understanding the value chain comprehensively (Prades-Illanes & Tello-Casas, 2021).

Aligned with Juste et al. (2016) we conclude that Spanish industry has made substantial progress in incorporating services into its production processes, not only catching up with more

advanced European economies but also reshaping its geographical sourcing strategy. This shift involves a relatively greater reliance on domestically supplied intermediate services. This development is closely linked to the competitive strength of Spanish service companies, which have significantly expanded their global market share in recent years. It also suggests a discernible upgrading process within the value chain.

In the results, it is evident that Spain has made significant strides in aligning with the characteristics of more advanced European economies in terms of services integration. This strategic reorientation, marked by a greater reliance on domestically supplied intermediate services, is indicative of the competitive prowess of Spanish service companies. Moreover, Spain's active role in GVCs, particularly in sectors like manufacturing and construction, highlights its integration into international production processes. However, the high import dependency on central EU countries, especially in manufacturing, poses challenges to sustaining production growth and income.

Spain plays an integral role in global value chains, particularly in sectors such as manufacturing and construction. This presence underscores Spain's active participation in international production processes. Notably, Spain's involvement in vertical specialization and global production fragmentation has led to a high dependence on imported intermediate goods in certain industries, particularly in manufacturing. This integration allows Spanish companies to access advanced technologies and high-quality inputs, ultimately contributing to improved productivity.

The available data confirm the significant disparity in the participation of different countries in GVCs, affecting both intensity and the type of backward or forward participation. Countries with more substantial GVC participation are more vulnerable to the propagation of shocks, such as the one associated with COVID-19, through interconnected production networks established across various countries. The role of services in GVCs and their contribution to the spread of such shocks cannot be understated.

Spain's trade balances exhibit diverse patterns, with transitions to surplus balances in specific trade relationships, both within the EU and with non-European partners. However, it is essential to acknowledge Spain's relatively higher import dependency concerning intermediate goods from central EU countries. This dependency, while not alarming, poses challenges to sustaining production growth and income, requiring a stronger push for domestic demand and exports to advance the per capita income convergence process.

In an increasingly globalized economy actively participating in the international division of labor and aiming to reap the benefits of specialization, a reduction in imported production inputs does not seem feasible or desirable. Spain's level of economic dependence appears relatively moderate within the European context, considering its relative size and participation in the reorganization of global production processes in recent decades. However, the higher import dependency on central EU countries raises concerns, as it limits growth opportunities in production and income in the face of increasing demand.

In conclusion, this discussion underscores the transformative role of services in modern global value chains, the necessity of robust measurement frameworks, and Spain's integral role and challenges in the evolving landscape of international trade. These insights contribute to a deeper understanding of the dynamics shaping contemporary global economics.

### **Limitations and Future Research**

The volume of data and the available time for this research project focused on the structural indicators outlined in the OECD TiVA Guide. Furthermore, it would have been desirable to expand the research to encompass additional sectors and countries, potentially revealing more dynamic patterns in foreign trade behavior. However, considering this as an introductory investigation aimed at exploring the merits of TiVA indicators and the FIGARO database, it is evident that this work can be extended through a detailed analysis of the following value-added indicators. This extension can provide answers to various other questions, such as: What is the domestic value added that Spain incorporates into its exports and what are its destinations? What percentage of foreign value added does Spain include in its exports, and what are its sources? Consequently, it can shed light on questions like: What portion of Spanish wages is paid by the foreign sector, and from which sources? These questions represent potential avenues for future research.

#### *Acknowledgments and Disclaimer*

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## Bibliography

- Abdmoulah, W. (2023). Export sophistication and economic performance, new evidence using TiVA database. *International Review of Applied Economics*, 37(1), 113-137. <https://doi.org/10.1080/02692171.2022.2026299>
- Amador, J. L. M., & Cabral, S. (2014). Global Value Chains: Surveying Drivers and Measures. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2510825>
- Antràs, P. (2003). FIRMS, CONTRACTS, AND TRADE STRUCTURE. *QUARTERLY JOURNAL OF ECONOMICS*.
- Antràs, P., Chor, D., Fally, T., & Hillberry, R. (2012). Measuring the Upstreamness of Production and Trade Flows. *American Economic Review*, 102(3), 412-416. <https://doi.org/10.1257/aer.102.3.412>
- Baldwin, R. (2012). *WTO 2.0: Global governance of supply-chain trade*. 64.
- Bonet, A. (2014). El comercio español en valor añadido: La cara oculta del sector exterior. *Real Instituto Elcano*.
- Chen, H., Kondratowicz, M., & Yi, K.-M. (2005). Vertical specialization and three facts about U.S. international trade. *The North American Journal of Economics and Finance*, 16(1), 35-59. <https://doi.org/10.1016/j.najef.2004.12.004>
- Coeuré, S. B., Guellec, S. D., Lefebvre, S. C., & Messerlin, S. P. (2010). *IV. Conclusión general del Sr. Jean Arthuis: Los responsables políticos ante la globalización*.
- Daudin, G., Rifflart, C., & Schweisguth, D. (2011). Who produces for whom in the world economy? *Canadian Journal of Economics/Revue Canadienne d'économique*, 44(4), 1403-1437. <https://doi.org/10.1111/j.1540-5982.2011.01679.x>
- Díaz-Mora, C., Gangoy Juste, R., & Córcoles González, D. (2020). Servitización y exportaciones de las manufacturas españolas. *ICE, Revista de Economía*, 913. <https://doi.org/10.32796/ice.2020.913.6988>
- Dicken, P. (2007). *Global shift: Mapping the changing contours of the world economy*. SAGE Publications Ltd.
- European Central Bank. (2016). *Understanding the weakness in global trade: What is the new normal?*. N° 178 / September 2016. Publications Office. <https://data.europa.eu/doi/10.2866/285803>

- Fally, T. (2012). Production Staging: Measurement and Facts. *University of Colorado-Boulder*.
- Feenstra, R. C., & Hanson, G. H. (1996). Globalization, Outsourcing, and Wage Inequality. *The American Economic Review*, 86(2), 240-245.
- Feenstra, R. C., & Hanson, G. H. (1999). The Impact of Outsourcing and High-Technology Capital on Wages: Estimates for the United States, 1979-1990. *The Quarterly Journal of Economics*, 114(3), 907-940.
- Feenstra, R. C., & Jensen, J. B. (2012). Evaluating estimates of materials offshoring from US manufacturing. *Economics Letters*, 117(1), 170-173. <https://doi.org/10.1016/j.econlet.2012.04.069>
- Freund, C. (2009). *The Trade Response To Global Downturns: Historical Evidence*. The World Bank. <https://doi.org/10.1596/1813-9450-5015>
- Gandoy, R. (2019). La dependencia importadora de la economía española. *Estudios de Economía Aplicada*, 35(1), 111. <https://doi.org/10.25115/eea.v35i1.2440>
- Hijzen, A. (2005). A bird's eye view of international outsourcing: Data, measurement and labour demand effects: *Économie Internationale*, no 104(4), 45-63. <https://doi.org/10.3917/eoi.104.0045>
- Hummels, D., Ishii, J., & Yi, K.-M. (2001). The nature and growth of vertical specialization in world trade. *Journal of International Economics*.
- Hummels, D., Rapoport, D., & Yi, K.-M. (1998). *Vertical Specialization and the Changing Nature of World Trade*.
- Irwin, D. A. (2002). Long-run trends in world trade and income. *World Trade Review*, 1(1), 89-100. <https://doi.org/10.1017/S1474745601001057>
- Johnson, R. C., & Noguera, G. (2012a). Accounting for intermediates: Production sharing and trade in value added. *Journal of International Economics*, 86(2), 224-236. <https://doi.org/10.1016/j.jinteco.2011.10.003>
- Johnson, R. C., & Noguera, G. (2012b). Proximity and Production Fragmentation. *American Economic Review*, 102(3), 407-411. <https://doi.org/10.1257/aer.102.3.407>

- Johnson, R., & Noguera, G. (2012). *Fragmentation and Trade in Value Added over Four Decades* (w18186; p. w18186). National Bureau of Economic Research. <https://doi.org/10.3386/w18186>
- Juste, R. G., Díaz-Mora, C., & González-Díaz, B. (2016). EL PAPEL DE LOS SERVICIOS EN LAS CADENAS GLOBALES DE VALOR DE LAS MANUFACTURAS (\*). . . ISSN.
- Kersan-Škabić, I. (2017). Trade in Value Added (TiVA) in EU New Member States (EU NMS). *Croatian Economic Survey*, 19(2), 105-133. <https://doi.org/10.15179/ces.19.2.4>
- Koopman, R., Wang, Z., & Wei, S.-J. (2014). Tracing Value-Added and Double Counting in Gross Exports. *American Economic Review*, 104(2), 459-494. <https://doi.org/10.1257/aer.104.2.459>
- Martins Guilhoto, J., Webb, C., & Yamano, N. (2022). *Guide to OECD TiVA Indicators, 2021 edition* (OECD Science, Technology and Industry Working Papers 2022/02; OECD Science, Technology and Industry Working Papers, Vol. 2022/02). OECD. <https://doi.org/10.1787/58aa22b1-en>
- OECD Inter-Country Input-Output (ICIO) Tables—OECD*. (s. f.). Recuperado 12 de septiembre de 2023, de <https://www.oecd.org/sti/ind/inter-country-input-output-tables.htm>
- Prades, E., & Villanueva, P. (2017). España en las cadenas globales de valor. *Banco de España*.
- Prades-Illanes, E., & Tello-Casas, P. (2021). El comercio mundial y la crisis de COVID-19: El papel de las cadenas globales de valor en la propagación de shocks. *ICE, Revista de Economía*, 923. <https://doi.org/10.32796/ice.2021.923.7325>
- Sturgeon, T. (2015, mayo 20). *Trade in value added indicators: What they are, what they aren't, and where they're headed*. CEPR. <https://cepr.org/voxeu/columns/trade-value-added-indicators-what-they-are-what-they-arent-and-where-theyre-headed>
- Sturgeon, T. J. (2013). Global value chains and economic globalization. *Massachusetts Institute of Technology*.
- World Bank. (2020). *World Development Report 2020: Trading for Development in the Age of Global Value Chains*. Washington, DC: World Bank. <https://doi.org/10.1596/978-1-4648-1457-0>



# Appendix

## Appendix 1. Calculation of the TIVA PROD / VALU // PROD\_VASH Indicators

INDICADOR	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
2010 VALU	27.463,33 €	2.692,37 €	121.618,61 €	24.008,99 €	10.335,65 €	83.876,58 €	118.444,49 €	46.617,81 €	63.386,00 €	41.733,12 €	46.778,53 €	32.730,46 €	42.481,96 €	32.730,46 €	68.416,53 €	56.062,11 €	65.329,90 €	19.185,49 €	14.896,01 €
PROD	46.462,83 €	6.103,97 €	467.070,19 €	72.648,93 €	25.671,92 €	195.567,95 €	204.748,93 €	106.899,77 €	104.400,96 €	83.833,83 €	72.049,78 €	128.192,94 €	77.473,77 €	56.430,76 €	89.625,96 €	63.524,96 €	94.569,93 €	33.667,91 €	24.105,86 €
PROD_VASH	59.108 €	44.108 €	26.039 €	33.048 €	40.261 €	42.889 €	57.849 €	43.609 €	60.714 €	49.781 €	64.925 €	83.652 €	54.834 €	58.001 €	76.336 €	88.252 €	69.081 €	56.985 €	61.800 €
2011 VALU	27.893,55 €	2.558,74 €	125.679,71 €	23.855,39 €	10.716,61 €	64.847,59 €	120.172,81 €	47.773,11 €	63.085,25 €	41.237,31 €	45.309,66 €	113.179,41 €	42.834,98 €	33.540,72 €	68.461,37 €	55.386,69 €	65.706,48 €	19.027,86 €	15.546,66 €
PROD	47.747,84 €	5.745,93 €	489.187,24 €	69.294,99 €	25.842,93 €	160.223,97 €	206.722,89 €	108.834,69 €	104.909,97 €	82.798,82 €	70.994,78 €	132.645,33 €	76.851,75 €	57.126,74 €	89.604,96 €	62.857,94 €	95.363,90 €	33.397,88 €	24.864,86 €
PROD_VASH	58.423 €	44.539 €	25.699 €	34.433 €	41.463 €	40.474 €	58.133 €	43.898 €	60.700 €	49.800 €	63.820 €	85.323 €	55.743 €	58.723 €	76.400 €	88.433 €	68.900 €	56.973 €	62.523 €
2012 VALU	28.125,29 €	2.227,92 €	118.592,59 €	26.052,78 €	10.823,73 €	51.289,51 €	117.835,56 €	46.731,10 €	62.528,99 €	40.139,59 €	45.590,54 €	117.009,53 €	40.947,40 €	32.122,56 €	64.636,47 €	53.973,78 €	63.693,36 €	18.077,28 €	15.979,51 €
PROD	47.804,81 €	5.166,96 €	470.466,34 €	72.783,99 €	25.832,94 €	132.856,97 €	201.688,91 €	106.321,78 €	102.470,96 €	79.349,83 €	71.797,79 €	135.909,94 €	73.375,76 €	55.575,80 €	84.956,96 €	60.910,94 €	92.853,90 €	31.481,50 €	25.016,82 €
PROD_VASH	58.833 €	43.123 €	25.211 €	35.799 €	41.900 €	38.613 €	58.423 €	43.953 €	61.023 €	50.599 €	63.509 €	86.099 €	55.811 €	57.800 €	76.083 €	88.611 €	68.600 €	57.423 €	63.883 €
2013 VALU	29.558,57 €	1.900,73 €	114.664,40 €	23.256,94 €	11.436,24 €	49.255,60 €	117.583,63 €	45.841,83 €	59.217,37 €	39.674,33 €	40.556,08 €	120.478,61 €	39.585,14 €	30.707,48 €	66.377,18 €	54.013,88 €	61.579,56 €	17.899,08 €	16.482,25 €
PROD	52.047,82 €	4.170,97 €	457.263,25 €	75.969,99 €	25.833,92 €	117.941,98 €	200.690,89 €	102.246,73 €	98.417,00 €	75.669,82 €	65.934,82 €	135.813,96 €	72.285,74 €	56.603,78 €	84.938,95 €	60.233,94 €	91.467,91 €	30.060,94 €	25.046,83 €
PROD_VASH	56.799 €	45.573 €	25.088 €	30.611 €	44.273 €	41.768 €	58.599 €	44.838 €	60.173 €	52.433 €	61.511 €	88.711 €	54.763 €	54.253 €	78.153 €	89.673 €	67.323 €	59.543 €	65.811 €
2014 VALU	28.109,49 €	1.652,24 €	116.101,03 €	21.752,45 €	11.012,65 €	49.070,91 €	117.457,48 €	48.378,69 €	60.707,36 €	39.078,12 €	43.255,00 €	119.315,42 €	43.210,18 €	33.213,99 €	65.849,83 €	54.038,60 €	61.053,75 €	18.173,36 €	16.818,88 €
PROD	50.212,83 €	3.852,96 €	462.802,03 €	75.738,98 €	25.701,97 €	120.309,05 €	203.449,95 €	107.479,70 €	100.381,98 €	75.773,85 €	69.555,81 €	135.051,94 €	78.579,80 €	60.290,81 €	84.748,87 €	60.395,96 €	91.773,92 €	30.971,89 €	25.893,84 €
PROD_VASH	55.988 €	42.369 €	25.099 €	28.723 €	42.853 €	40.799 €	57.739 €	45.013 €	60.483 €	51.573 €	62.199 €	88.353 €	54.999 €	55.099 €	77.700 €	89.473 €	66.533 €	58.683 €	64.953 €
2015 VALU	32.013,31 €	1.489,98 €	121.785,03 €	19.497,51 €	11.232,48 €	52.093,97 €	123.042,86 €	51.161,63 €	65.150,51 €	39.405,25 €	42.987,20 €	118.040,63 €	47.430,19 €	37.393,90 €	66.706,20 €	55.809,02 €	64.287,99 €	19.971,30 €	17.566,66 €
PROD	54.720,81 €	3.733,92 €	470.339,81 €	68.987,97 €	26.517,93 €	125.007,02 €	211.485,94 €	111.637,75 €	105.630,98 €	76.110,81 €	69.118,87 €	133.832,97 €	85.121,79 €	66.960,77 €	85.974,96 €	62.259,95 €	96.584,91 €	33.112,87 €	26.987,82 €
PROD_VASH	58.500 €	39.900 €	25.899 €	28.266 €	42.368 €	41.673 €	58.188 €	45.838 €	61.668 €	51.773 €	62.199 €	88.200 €	55.723 €	55.844 €	77.599 €	89.644 €	66.566 €	60.311 €	65.099 €
2016 VALU	33.712,06 €	1.109,98 €	116.796,74 €	15.960,85 €	12.533,68 €	55.693,90 €	136.965,18 €	50.644,72 €	67.178,46 €	38.422,39 €	44.288,54 €	120.208,13 €	48.773,46 €	43.077,56 €	66.430,80 €	57.101,36 €	68.814,05 €	21.127,15 €	20.822,75 €
PROD	56.140,80 €	3.682,95 €	466.906,43 €	59.066,99 €	27.592,95 €	126.990,00 €	224.322,92 €	112.313,73 €	112.104,98 €	78.892,88 €	71.030,80 €	135.761,95 €	88.093,76 €	70.520,82 €	85.523,96 €	64.101,97 €	100.023,98 €	33.167,87 €	28.163,86 €
PROD_VASH	60.053 €	30.143 €	25.023 €	27.023 €	45.423 €	43.863 €	61.063 €	45.093 €	59.923 €	48.703 €	62.353 €	88.543 €	55.373 €	61.083 €	77.683 €	89.083 €	68.803 €	63.703 €	73.933 €
2017 VALU	34.173,28 €	1.582,12 €	123.562,04 €	16.481,29 €	13.039,57 €	60.080,21 €	141.544,74 €	51.993,45 €	72.905,33 €	40.852,37 €	45.231,70 €	123.501,31 €	51.301,92 €	45.547,56 €	65.751,28 €	58.810,39 €	71.608,63 €	23.604,01 €	21.777,42 €
PROD	57.536,80 €	4.355,95 €	504.725,51 €	61.479,97 €	29.056,96 €	138.652,97 €	232.750,88 €	116.140,73 €	120.504,98 €	83.729,87 €	72.950,85 €	139.823,98 €	91.963,77 €	75.496,78 €	85.451,99 €	66.124,97 €	104.639,91 €	36.612,92 €	29.479,81 €
PROD_VASH	59.399 €	36.329 €	24.489 €	26.811 €	44.889 €	43.339 €	60.811 €	44.773 €	60.500 €	48.799 €	60.339 €	88.339 €	55.773 €	60.339 €	76.959 €	88.944 €	68.439 €	64.473 €	73.873 €
2018 VALU	35.655,76 €	2.174,47 €	125.491,98 €	18.337,67 €	13.231,48 €	64.428,99 €	145.048,72 €	53.766,94 €	74.629,85 €	41.890,17 €	48.597,51 €	128.100,33 €	54.880,05 €	47.398,00 €	67.579,54 €	59.726,24 €	72.991,30 €	25.440,51 €	21.611,91 €
PROD	60.794,80 €	5.291,97 €	529.874,56 €	65.165,96 €	30.089,93 €	150.745,98 €	240.587,90 €	120.657,90 €	124.408,00 €	87.447,86 €	77.130,86 €	145.584,97 €	97.130,78 €	79.170,84 €	88.176,99 €	67.371,96 €	107.296,92 €	39.815,89 €	29.628,84 €
PROD_VASH	58.655 €	41.099 €	28.144 €	23.689 €	43.979 €	42.748 €	60.299 €	44.158 €	59.999 €	49.000 €	63.011 €	87.999 €	56.500 €	59.879 €	76.644 €	88.655 €	68.033 €	63.900 €	72.944 €
2019 VALU	34.638,81 €	2.373,68 €	127.067,23 €	17.801,70 €	13.776,13 €	70.420,02 €	148.732,39 €	55.578,37 €	77.817,66 €	43.793,45 €	47.912,79 €	133.717,77 €	59.188,39 €	51.349,43 €	69.883,79 €	60.906,98 €	76.710,29 €	26.606,22 €	22.919,93 €
PROD	59.867,80 €	5.864,93 €	535.992,45 €	65.814,98 €	31.701,93 €	167.296,96 €	249.460,96 €	127.596,72 €	130.840,99 €	92.043,86 €	76.442,86 €	152.582,95 €	105.486,79 €	84.372,75 €	99.517,97 €	68.779,94 €	113.114,98 €	42.156,88 €	31.688,87 €
PROD_VASH	57.866 €	40.473 €	23.711 €	27.053 €	43.466 €	42.093 €	59.623 €	47.588 €	59.473 €	47.588 €	62.688 €	87.633 €	56.111 €	60.866 €	76.366 €	88.555 €	67.823 €	63.111 €	72.336 €
2020 VALU	35.228,17 €	2.164,48 €	114.568,45 €	15.133,34 €	12.527,52 €	64.162,95 €	129.300,50 €	48.566,64 €	43.207,79 €	41.575,71 €	48.226,51 €	131.244,88 €	51.791,59 €	45.254,02 €	72.429,48 €	61.806,97 €	79.432,49 €	20.412,56 €	17.372,56 €
PROD	64.320,76 €	5.394,96 €	485.263,77 €	58.265,99 €	28.701,50 €	154.180,95 €	219.002,88 €	112.017,77 €	74.420,96 €	88.186,83 €	79.106,81 €	152.072,94 €	91.853,40 €	73.468,15 €	94.787,98 €	69.718,94 €	115.954,92 €	32.005,58 €	24.058,13 €
PROD_VASH	54.773 €	40.123 €	23.613 €	25.973 €	43.653 €	41.623 €	59.043 €	43.363 €	58.063 €	47.153 €	60.963 €	86.333 €	56.383 €	61.603 €	76.413 €	88.653 €	68.503 €	63.783 €	72.213 €

Appendix 2. Calculation of the TiVA EXGR / EXGR\_INT / EXGR\_FNL Indicators

	UE	UE/ESPAÑA	ESPAÑA	ALEMANIA	FRANCIA	ITALIA	PT	RESTUE (22)	NO-UE	ROW	REINO UNIDO	SUIZA	US	RUSIA	CHINA	RESTO W	TOTAL	TOTAL/ESPAÑA	
2010	C. INTERMED	851.247.703 €	68.891.190 €	12.718.337 €	11.952.245 €	11.895.445 €	11.952.245 €	15.694.547 €	39.404.969 €	25.615.245 €	6.784.699 €	5.741.759 €	2.719.417 €	1.863.046 €	4.181.816 €	43.729.477 €	916.267.917 €	133.911.404 €	
	D FINAL P3	776.105.675 €	30.995.514 €	3.526.127 €	5.392.747 €	4.216.342 €	5.392.747 €	5.933.656 €	21.567.696 €	9.849.216 €	5.664.495 €	1.755.031 €	3.892.747 €	1.035.838 €	724.791 €	18.404.030 €	807.522.587 €	61.912.426 €	
	D FINAL P4	215.178.130 €	13.639.046 €	2.624.722 €	4.414.930 €	1.435.073 €	1.637.066 €	3.527.253 €	17.450.330 €	8.746.780 €	874.835 €	1.446.354 €	1.777.059 €	567.470 €	13.782.230 €	13.782.230 €	239.882.328 €	33.343.244 €	
	T. OUTPUTS	1.842.531.508 €	113.025.750 €	1.729.505.758 €	18.869.186 €	32.472.388 €	18.723.663 €	25.155.258 €	43.714.013 €	74.330.083 €	43.714.013 €	13.324.029 €	8.943.144 €	7.129.223 €	3.466.334 €	5.762.857 €	75.915.737 €	1.963.672.832 €	234.167.277 €
	C. INTERMED	851.556.547 €	85.450.685 €	766.005.862 €	15.366.257 €	17.106.833 €	15.803.014 €	17.157.015 €	48.319.577 €	23.562.302 €	6.422.868 €	9.958.872 €	5.439.892 €	2.533.413 €	6.022.254 €	44.679.670 €	923.438.516 €	157.342.654 €	
D FINAL P3	779.480.063 €	34.458.679 €	4.471.384 €	10.221.495 €	6.463.300 €	5.217.235 €	6.410.395 €	24.104.395 €	9.662.216 €	4.387.138 €	1.855.151 €	4.964.085 €	1.386.441 €	1.973.175 €	19.307.887 €	812.604.488 €	67.633.074 €		
D FINAL P4	199.675.910 €	16.557.640 €	1.881.620 €	3.859.840 €	1.486.445 €	1.952.992 €	4.052.712 €	14.698.272 €	7.680.217 €	1.590.329 €	2.250.729 €	1.479.198 €	261.182 €	970.958 €	14.267.729 €	219.459.585 €	39.338.585 €		
T. OUTPUTS	1.827.660.520 €	136.567.044 €	1.691.093.516 €	23.367.450 €	37.387.504 €	25.448.781 €	27.470.446 €	66.532.028 €	38.252.281 €	11.341.595 €	11.064.359 €	4.563.695 €	4.541.036 €	8.071.385 €	78.235.286 €	1.955.497.829 €	364.404.313 €		
2011	C. INTERMED	818.616.618 €	85.768.066 €	732.848.552 €	16.207.054 €	15.888.967 €	15.343.268 €	17.474.062 €	50.758.010 €	27.250.452 €	6.782.081 €	5.965.223 €	3.104.875 €	5.632.024 €	50.175.982 €	896.625.063 €	163.776.511 €		
	D FINAL P3	758.373.473 €	33.026.616 €	3.926.928 €	4.651.396 €	3.804.011 €	4.651.396 €	5.456.681 €	12.495.458 €	5.984.019 €	1.893.901 €	1.657.047 €	1.657.047 €	1.260.063 €	22.954.995 €	796.325.612 €	70.978.684 €		
	D FINAL P4	168.994.595 €	13.865.644 €	1.551.288.91 €	3.447.651 €	1.134.120 €	1.604.135 €	3.844.882 €	14.561.473 €	9.837.056 €	5.946.439 €	2.155.067 €	3.819.970 €	818.533 €	1.100.637 €	16.057.872 €	193.393.133 €	38.764.183 €	
	T. OUTPUTS	1.745.984.686 €	132.660.255 €	1.613.324.431 €	24.306.101 €	36.916.348 €	22.833.535 €	27.421.888 €	90.776.164 €	49.582.958 €	12.588.618 €	10.831.048 €	14.287.440 €	5.580.442 €	7.902.724 €	89.188.849 €	1.886.343.808 €	273.919.377 €	
	C. INTERMED	801.872.064 €	98.615.904 €	708.256.160 €	18.516.058 €	24.659.842 €	14.735.501 €	14.474.303 €	26.235.200 €	45.399.882 €	29.400.639 €	6.821.198 €	5.369.494 €	4.316.417 €	3.043.409 €	5.102.485 €	50.886.118 €	876.672.185 €	173.416.020 €
D FINAL P3	744.660.193 €	35.782.147 €	708.878.046 €	5.050.248 €	12.696.523 €	5.823.256 €	4.408.775 €	7.803.345 €	21.758.522 €	14.009.361 €	4.063.244 €	3.348.416 €	4.197.710 €	1.738.960 €	9.251.691 €	23.533.862 €	780.468.076 €	71.590.035 €	
D FINAL P4	159.066.872 €	16.046.039 €	143.020.833 €	4.006.249 €	4.498.317 €	1.077.086 €	1.469.194 €	4.995.193 €	14.622.564 €	11.228.644 €	696.594 €	1.365.913 €	4.356.872 €	883.442 €	1.048.234 €	17.540.153 €	184.918.080 €	41.897.247 €	
T. OUTPUTS	1.705.599.129 €	150.444.090 €	1.555.155.039 €	27.572.555 €	41.849.682 €	21.635.843 €	20.352.272 €	39.033.738 €	81.780.968 €	54.678.644 €	10.492.036 €	8.083.823 €	12.850.999 €	5.665.811 €	7.076.410 €	91.940.133 €	1.842.058.341 €	286.903.307 €	
2014	C. INTERMED	818.846.516 €	103.417.012 €	715.429.504 €	19.826.657 €	24.016.632 €	16.890.249 €	15.137.387 €	26.092.706 €	7.369.146 €	5.005.899 €	8.391.17 €	2.695.771 €	5.415.720 €	48.352.184 €	896.076.402 €	180.646.898 €		
	D FINAL P3	749.876.682 €	36.295.675 €	713.581.007 €	5.149.324 €	12.111.045 €	6.020.019 €	4.712.560 €	23.194.719 €	12.699.845 €	5.866.046 €	1.288.404 €	4.497.974 €	1.440.443 €	932.188 €	22.340.509 €	785.762.246 €	72.181.239 €	
	D FINAL P4	166.603.981 €	17.373.112 €	149.230.869 €	4.499.435 €	4.520.033 €	1.264.356 €	1.541.137 €	5.547.977 €	10.616.168 €	1.039.361 €	1.375.249 €	3.067.025 €	937.135 €	1.010.949 €	16.631.771 €	190.645.471 €	41.414.620 €	
	T. OUTPUTS	1.735.327.179 €	157.085.799 €	1.578.241.380 €	29.475.416 €	40.647.710 €	23.536.824 €	21.537.375 €	41.888.474 €	88.210.428 €	48.946.512 €	13.744.553 €	7.669.552 €	15.956.165 €	5.073.349 €	73.588.927 €	87.324.464 €	1.872.484.119 €	294.242.739 €
	C. INTERMED	825.900.609 €	104.961.318 €	720.939.291 €	19.497.691 €	23.758.632 €	16.314.113 €	14.992.303 €	30.398.579 €	48.538.897 €	27.061.381 €	6.613.573 €	5.293.128 €	4.302.804 €	2.110.963 €	8.390.383 €	48.889.427 €	901.500.887 €	180.561.596 €
D FINAL P3	769.001.000 €	37.457.541 €	731.543.459 €	5.357.199 €	12.042.594 €	6.493.596 €	5.430.755 €	14.329.859 €	24.769.876 €	14.329.859 €	4.944.830 €	1.448.868 €	4.924.088 €	847.916 €	1.640.435 €	25.293.598 €	808.100.735 €	76.557.276 €	
D FINAL P4	183.926.102 €	21.086.455 €	162.839.647 €	5.019.087 €	6.896.118 €	1.617.981 €	1.778.193 €	5.775.076 €	21.972.581 €	8.345.070 €	967.510 €	1.732.568 €	10.393.662 €	929.894 €	1.159.401 €	15.134.816 €	214.243.753 €	51.404.106 €	
T. OUTPUTS	1.778.827.111 €	163.505.314 €	1.615.322.397 €	29.873.977 €	42.697.344 €	24.425.690 €	22.201.251 €	44.307.052 €	95.281.354 €	49.736.310 €	12.252.913 €	8.474.564 €	16.620.554 €	3.888.573 €	11.190.219 €	89.317.841 €	1.923.845.375 €	308.222.978 €	
2016	C. INTERMED	829.632.633 €	111.201.087 €	718.431.546 €	21.663.384 €	25.458.518 €	16.022.380 €	32.728.039 €	48.796.978 €	27.835.984 €	4.866.188 €	5.454.459 €	6.307.220 €	1.794.626 €	8.626.808 €	49.553.670 €	906.265.615 €	87.834.049 €	
	D FINAL P3	791.390.367 €	40.773.960 €	751.116.407 €	6.367.387 €	12.607.255 €	7.205.419 €	5.497.956 €	25.704.079 €	14.901.567 €	4.107.410 €	1.777.907 €	4.540.027 €	825.982 €	1.713.488 €	26.746.832 €	831.996.013 €	80.789.606 €	
	D FINAL P4	188.623.451 €	22.048.743 €	166.574.708 €	5.010.086 €	6.685.403 €	2.542.053 €	1.939.844 €	6.159.357 €	10.601.848 €	563.457 €	1.703.824 €	6.327.244 €	449.988 €	914.016 €	17.321.159 €	215.903.119 €	49.328.411 €	
	T. OUTPUTS	1.809.646.471 €	173.523.790 €	1.636.122.681 €	33.040.857 €	44.751.176 €	25.482.952 €	22.766.366 €	47.483.339 €	91.178.877 €	53.339.399 €	9.957.055 €	8.936.181 €	18.068.491 €	3.070.576 €	11.254.312 €	93.621.661 €	1.954.164.747 €	318.042.066 €
	C. INTERMED	884.798.086 €	123.700.629 €	761.097.457 €	22.433.299 €	30.310.827 €	18.493.749 €	16.621.816 €	36.140.938 €	52.185.773 €	29.751.107 €	4.689.606 €	5.237.833 €	7.053.417 €	2.095.733 €	9.357.455 €	53.502.336 €	966.734.466 €	205.637.009 €
D FINAL P3	821.948.963 €	43.618.895 €	778.330.068 €	6.810.991 €	13.328.039 €	8.057.252 €	5.967.588 €	9.455.025 €	25.701.766 €	15.555.098 €	3.717.886 €	1.676.168 €	5.436.691 €	976.073 €	1.808.045 €	27.628.104 €	863.105.827 €	84.875.259 €	
D FINAL P4	203.165.912 €	23.416.692 €	179.752.220 €	6.391.699 €	6.000.832 €	2.314.814 €	2.294.692 €	6.414.857 €	17.693.843 €	10.665.700 €	966.598 €	1.674.348 €	6.435.365 €	549.981 €	1.153.294 €	17.947.959 €	231.526.454 €	51.774.234 €	
T. OUTPUTS	1.909.815.961 €	190.736.216 €	1.719.079.745 €	35.635.989 €	49.639.688 €	28.965.813 €	24.884.096 €	52.010.820 €	95.580.881 €	55.969.905 €	9.017.990 €	8.588.346 €	18.925.473 €	3.621.787 €	12.818.791 €	99.078.959 €	2.061.566.747 €	342.287.002 €	
2017	C. INTERMED	938.086.595 €	133.396.256 €	804.690.339 €	23.423.453 €	34.395.843 €	18.728.212 €	18.129.989 €	46.589.016 €	26.491.634 €	4.551.522 €	5.190.782 €	2.875.879 €	2.207.885 €	8.658.721 €	49.595.861 €	1.011.167.245 €	206.476.906 €	
	D FINAL P3	845.680.348 €	45.105.507 €	800.574.841 €	6.642.400 €	14.150.531 €	7.657.899 €	6.491.953 €	10.162.724 €	26.768.224 €	14.412.718 €	3.765.574 €	5.548.025 €	6.238.578 €	2.192.642 €	26.409.749 €	886.861.290 €	86.286.449 €	
	D FINAL P4	224.036.757 €	27.992.819 €	196.043.938 €	6.436.974 €	9.578.585 €	2.365.932 €	6.958.163 €	24.972.603 €	9.472.878 €	583.756 €	1.661.926 €	14.165.285 €	521.378 €	1.251.060 €	16.262.078 €	258.482.240 €	62.388.302 €	
	T. OUTPUTS	2.007.803.700 €	206.944.582 €	1.801.309.118 €	36.502.827 €	58.124.959 €	28.732.043 €	27.295.107 €	55.839.446 €	98.372.695 €	50.377.230 €	8.900.853 €	8.400.733 €	23.279.422 €	3.755.636 €	12.102.423 €	92.267.688 €	2.156.510.775 €	355.201.657 €
	C. INTERMED	979.086.798 €	133.845.295 €	845.241.503 €	22.349.681 €	30.310.827 €	20.044.901 €	18.215.772 €	42.421.278 €	46.884.541 €	30.885.430 €	4.807.368 €	5.995.340 €	2.611.900 €	2.100.375 €	8.234.811 €	53.910.177 €	1.056.856.789 €	211.615.266 €
D FINAL P3	869.286.597 €	46.346.738 €	822.941.859 €	6.616.144 €	14.144.163 €	8.043.454 €	6.372.796 €	11.170.181 €	26.473.353 €	15.651.073 €	3.808.472 €	1.714.053 €	6.175.084 €	1.713.488 €	27.067.082 €	911.415.033 €	88.771.164 €		
D FINAL P4	240.159.199 €	30.384.714 €	209.774.485 €	6.724.349 €	9.705.330 €	2.466.378 €	2.575.681 €	8.929.276 €	23.575.712 €	10.440.123 €	995.752 €	1.971.504 €	13.039.123 €	580.279 €	1.075.507 €	16.753.670 €	274.175.084 €	64.400.549 €	

Appendix 3. Calculation of the TiVA IMGR / IMGR\_INT / IMGR\_FNL Indicators

	UE	UE/ESPAÑA	ESPAÑA	ALEMANIA	FRANCIA	ITALIA	PT	REST UE (22)	NO-UE	ROW	REINO UNIDO	SUIZA	US	RUSIA	CHINA	RESTO W	TOTAL	TOTAL /ESPAÑA	
2010	C. INTERMED	863.685.649 €	81.329.136 €	782.356.513 €	18.846.806 €	18.270.427 €	7.359.594 €	23.623.831 €	69.095.461 €	11.265.163 €	3.731.918 €	8.421.695 €	4.496.234 €	1.699.346 €	7.126.337 €	61.028.629 €	959.575.625 €	107.399.110 €	
	D FINAL P3	740.310.366 €	34.921.205 €	705.389.161 €	18.846.806 €	18.270.427 €	7.359.594 €	23.623.831 €	69.095.461 €	11.265.163 €	3.731.918 €	8.421.695 €	4.496.234 €	1.699.346 €	7.126.337 €	61.028.629 €	959.575.625 €	107.399.110 €	
	D FINAL P5	218.112.039 €	16.572.959 €	201.539.084 €	5.206.755 €	29.264.312 €	2.604.634 €	5.482.634 €	6.723.400 €	6.723.400 €	430.514 €	599.697 €	935.760 €	55.560 €	2.782.415 €	3.289.296 €	226.204.981 €	24.665.897 €	
	T. INPUTS	1.862.219.054 €	132.824.296 €	1.729.394.758 €	31.847.586 €	29.264.312 €	20.979.504 €	30.339.734 €	98.046.526 €	40.243.697 €	14.912.381 €	6.912.926 €	12.740.230 €	4.720.948 €	15.501.081 €	6.950.267 €	2.000.619.077 €	271.113.819 €	
	C. INTERMED	842.869.857 €	76.865.995 €	766.003.862 €	17.349.814 €	18.687.993 €	13.060.562 €	7.277.401 €	20.488.225 €	87.426.670 €	27.104.238 €	3.460.071 €	14.693.947 €	6.157.879 €	8.561.212 €	69.095.770 €	957.400.765 €	191.394.903 €	
D FINAL P3	719.277.207 €	34.740.823 €	744.971.384 €	7.770.198 €	9.066.024 €	3.054.080 €	3.217.990 €	9.297.734 €	25.092.799 €	6.216.342 €	6.216.342 €	9.297.734 €	21.901.901 €	818.295.358 €	73.323.974 €	76.257.991 €	76.257.991 €		
D FINAL P5	196.259.696 €	16.443.246 €	180.116.270 €	4.738.198 €	2.800.142 €	4.004.704 €	708.391 €	4.851.991 €	8.308.261 €	1.806.304 €	586.948 €	629.162 €	75.621 €	3.694.273 €	4.211.886 €	260.374.261 €	23.997.991 €		
T. INPUTS	1.818.941.760 €	127.748.244 €	1.691.093.516 €	29.858.207 €	30.594.159 €	21.518.346 €	11.959.582 €	22.896.341 €	79.655.448 €	32.840.765 €	13.086.886 €	3.096.939 €	17.779.235 €	6.771.893 €	9.109.886 €	920.245.767 €	290.976.868 €		
2011	C. INTERMED	807.749.554 €	732.848.552 €	782.848.552 €	16.880.315 €	16.435.435 €	11.701.596 €	6.977.315 €	24.856.844 €	79.625.448 €	14.104.099 €	6.216.342 €	4.720.948 €	1.699.346 €	7.126.337 €	62.501.589 €	957.400.765 €	191.394.903 €	
	D FINAL P3	758.337.383 €	33.590.455 €	725.346.928 €	7.338.303 €	8.159.210 €	5.049.873 €	3.135.248 €	9.908.823 €	24.459.882 €	14.104.099 €	6.216.342 €	4.720.948 €	1.699.346 €	7.126.337 €	62.501.589 €	957.400.765 €	191.394.903 €	
	D FINAL P5	168.889.115 €	13.760.164 €	155.128.951 €	4.003.629 €	2.225.216 €	2.619.098 €	536.581 €	4.375.604 €	7.537.709 €	4.478.765 €	460.848 €	692.808 €	27.350 €	3.176.563 €	1.770.589 €	177.062.228 €	206.122.937 €	
	T. INPUTS	1.735.256.602 €	122.251.621 €	1.613.004.981 €	28.232.245 €	26.818.861 €	19.370.567 €	13.345.911 €	46.155.109 €	38.291.635 €	14.787.651 €	11.151.109 €	7.537.709 €	2.720.504 €	10.333.387 €	73.977.480 €	1.832.391.084 €	217.236.638 €	
	C. INTERMED	798.213.839 €	94.957.679 €	703.256.160 €	20.019.557 €	23.374.248 €	11.976.261 €	9.362.914 €	30.227.699 €	66.706.993 €	27.649.921 €	4.061.436 €	8.204.841 €	6.408.872 €	10.093.533 €	55.967.098 €	892.570.342 €	189.314.182 €	
2013	D FINAL P3	743.762.488 €	34.384.442 €	708.278.046 €	7.513.727 €	8.496.153 €	4.168.575 €	3.254.629 €	10.951.598 €	19.580.907 €	17.698.033 €	2.647.97 €	414.609 €	4.460.955 €	17.446.497 €	774.421.398 €	65.543.351 €		
	D FINAL P5	158.975.641 €	15.954.808 €	143.020.833 €	4.746.368 €	2.869.334 €	2.634.686 €	728.388 €	4.976.053 €	7.359.594 €	4.23.591 €	846.971 €	843.900 €	196.018 €	513.885 €	165.390.344 €	22.378.511 €		
	T. INPUTS	1.700.451.968 €	145.296.629 €	1.555.155.039 €	32.279.652 €	34.736.735 €	18.779.522 €	13.345.911 €	46.155.109 €	38.291.635 €	14.787.651 €	11.151.109 €	7.537.709 €	2.720.504 €	10.333.387 €	73.977.480 €	1.832.391.084 €	217.236.638 €	
	C. INTERMED	815.961.728 €	100.532.224 €	715.429.504 €	22.406.015 €	22.977.832 €	12.736.351 €	9.655.068 €	32.756.958 €	68.192.57 €	30.582.584 €	10.738.452 €	4.951.840 €	5.470.026 €	11.478.702 €	56.804.672 €	914.736.839 €	199.307.335 €	
	D FINAL P3	750.101.542 €	36.520.535 €	713.581.007 €	8.817.633 €	4.317.314 €	3.476.640 €	3.252.614 €	11.659.914 €	20.810.147 €	19.120.520 €	2.776.084 €	2.740.868 €	3.567.010 €	380.076 €	18.229.412 €	782.824.309 €	69.243.302 €	
2014	D FINAL P5	166.937.075 €	17.706.206 €	149.230.869 €	5.392.477 €	3.227.834 €	2.914.223 €	815.248 €	5.356.424 €	7.734.794 €	416.828 €	692.506 €	884.287 €	104.590 €	4.337.417 €	846.255 €	174.010.018 €	24.779.149 €	
	T. INPUTS	1.733.000.345 €	154.758.965 €	1.578.241.380 €	36.616.125 €	34.619.397 €	20.027.214 €	13.722.933 €	49.773.296 €	96.737.470 €	41.833.351 €	13.931.364 €	8.385.214 €	5.745.752 €	20.845.456 €	75.880.339 €	1.871.571.166 €	293.329.786 €	
	C. INTERMED	823.856.495 €	102.917.164 €	720.939.291 €	24.372.579 €	22.459.170 €	12.818.196 €	9.075.649 €	34.193.570 €	74.860.552 €	28.345.221 €	11.855.963 €	5.145.444 €	6.667.053 €	13.782.716 €	59.599.737 €	977.062.228 €	206.122.937 €	
	D FINAL P3	767.546.392 €	36.002.933 €	731.543.459 €	19.393.647 €	16.664.708 €	4.352.191 €	916.991 €	6.478.684 €	8.587.088 €	1.802.424 €	481.652 €	818.966 €	1.400 €	4.300.587 €	3.685.006 €	196.747.209 €	30.172.501 €	
	T. INPUTS	1.801.425.639 €	165.302.958 €	1.636.122.681 €	39.293.139 €	35.715.443 €	21.773.336 €	13.789.899 €	55.331.141 €	101.019.086 €	42.809.387 €	13.538.599 €	9.815.010 €	15.368.503 €	3.387.347 €	21.008.671 €	80.710.248 €	1.945.254.012 €	309.131.331 €
2015	C. INTERMED	875.417.365 €	114.719.908 €	761.097.457 €	25.270.022 €	26.701.038 €	14.522.761 €	9.996.647 €	36.629.434 €	81.901.498 €	30.412.106 €	6.103.630 €	12.145.822 €	3.543.761 €	12.981.953 €	67.163.680 €	988.130.970 €	227.033.513 €	
	D FINAL P3	818.985.410 €	40.755.342 €	778.230.068 €	9.586.724 €	8.727.595 €	4.999.675 €	3.332.217 €	14.108.131 €	24.999.084 €	14.100.785 €	2.765.202 €	3.344.561 €	3.011.279 €	6.107.445 €	22.275.507 €	888.085.276 €	78.855.206 €	
	D FINAL P5	200.962.230 €	21.210.010 €	179.752.220 €	6.210.163 €	3.527.495 €	3.663.821 €	920.458 €	6.888.073 €	9.886.138 €	1.793.942 €	473.520 €	836.765 €	1.147.479 €	13.382 €	5.146.921 €	212.642.310 €	32.890.090 €	
	T. INPUTS	1.895.755.005 €	176.685.260 €	1.719.079.745 €	41.066.915 €	38.956.128 €	23.186.257 €	13.850.322 €	59.625.638 €	116.786.718 €	46.306.833 €	13.611.481 €	10.284.956 €	17.601.173 €	3.858.422 €	24.236.319 €	93.501.200 €	2.058.858.556 €	338.778.811 €
	C. INTERMED	926.008.825 €	121.318.486 €	804.690.339 €	25.522.048 €	28.921.630 €	15.005.408 €	10.596.029 €	41.273.371 €	89.331.752 €	30.550.774 €	11.505.355 €	5.874.102 €	8.252.895 €	3.056.262 €	17.828.769 €	1.045.891.351 €	241.201.012 €	
2018	D FINAL P3	842.883.846 €	22.446.365 €	809.774.485 €	6.141.474 €	3.696.924 €	4.051.922 €	1.114.333 €	7.441.714 €	11.369.858 €	2.365.663 €	459.465 €	704.045 €	1.254.297 €	38.221 €	6.322.935 €	945.956.191 €	36.181.706 €	
	D FINAL P5	219.753.659 €	23.709.721 €	196.043.938 €	6.452.029 €	4.117.391 €	4.152.274 €	1.139.137 €	7.848.890 €	10.926.533 €	2.022.833 €	535.531 €	780.798 €	29.846 €	5.832.882 €	4.527.047 €	232.703.025 €	36.659.087 €	
	T. INPUTS	1.988.646.330 €	187.337.212 €	1.801.309.118 €	41.465.341 €	42.837.372 €	24.271.591 €	15.146.252 €	63.166.856 €	127.171.697 €	47.092.892 €	15.154.297 €	10.278.158 €	18.309.219 €	3.423.352 €	26.375.667 €	100.723.696 €	2.162.910.719 €	361.601.601 €
	C. INTERMED	965.752.332 €	120.510.829 €	845.241.503 €	25.050.642 €	29.497.749 €	14.187.169 €	9.850.162 €	40.240.107 €	92.610.860 €	33.071.342 €	10.429.925 €	17.719.272 €	4.019.925 €	14.081.179 €	74.028.199 €	1.091.434.534 €	246.193.031 €	
	D FINAL P3	864.448.628 €	41.506.769 €	822.941.859 €	9.222.452 €	9.289.971 €	4.991.520 €	3.177.707 €	14.825.119 €	26.655.177 €	16.241.186 €	2.650.778 €	3.094.338 €	331.367 €	6.802.501 €	24.829.496 €	907.344.991 €	84.403.132 €	
2019	D FINAL P5	232.220.870 €	28.446.385 €	209.774.485 €	6.141.474 €	3.696.924 €	4.051.922 €	1.114.333 €	7.441.714 €	11.369.858 €	2.365.663 €	459.465 €	704.045 €	1.254.297 €	38.221 €	6.322.935 €	945.956.191 €	36.181.706 €	
	T. INPUTS	2.062.021.830 €	184.463.983 €	1.877.957.847 €	40.414.568 €	42.479.644 €	23.330.611 €	14.422.220 €	64.196.940 €	130.635.895 €	51.677.991 €	13.539.991 €	9.202.462 €	24.161.652 €	4.389.513 €	27.206.039 €	103.814.629 €	366.777.869 €	
	C. INTERMED	885.357.874 €	108.386.479 €	776.971.395 €	22.860.758 €	25.021.423 €	13.687.941 €	9.501.087 €	37.315.270 €	78.440.256 €	24.528.521 €	9.081.847 €	5.106.822 €	4.485.502 €	14.331.109 €	55.074.454 €	988.326.651 €	211.355.256 €	
	D FINAL P3	779.277.305 €	36.002.521 €	743.274.784 €	7.635.097 €	7.613.871 €	4.589.991 €	3.117.972 €	13.045.590 €	22.612.871 €	12.101.247 €	1.928.962 €	3.325.421 €	208.088 €	6.781.448 €	18.583.544 €	813.991.423 €	70.716.639 €	
	D FINAL P5	209.427.461 €	18.015.643 €	191.411.818 €	4.960.996 €	2.814.033 €	3.666.882 €	1.004.156 €	5.569.576 €	9.370.015 €	1.563.789 €	354.988 €	895.222 €	0.406 €	5.729.588 €	3.991.612 €	220.361.265 €	28.949.447 €	
T. INPUTS	1.874.062.640 €	162.404.643 €	1.711.657.997 €	35.456.851 €	35.449.327 €	21.944.814 €	13.623.215 €	55.930.438 €	110.423.142 €	38.193.557 €	11.365.797 €	8.996.031 €	4.693.996 €	26.841.945 €	77.049.610 €	2.022.679.339 €	311.021.342 €		

Appendix 4. Calculation of the TiVA BALGR Indicators

	UE	UE/ESPAÑA	ESPAÑA	ALEMANIA	FRANCIA	ITALIA	PT	REST UE (22)	NO-UE	ROW	REINO UNIDO	SUIZA	US	RUSIA	CHINA	RESTO W	TOTAL	TOTAL/ESPAÑA
C. INTERMED	-12.437.946 €	-12.437.946 €	0,000 €	-6.128.469 €	-1.639.658 €	-1.333.198 €	4.592.651 €	-7.929.272 €	-29.690.492 €	-1.359.270 €	-4.480.464 €	2.009.841 €	-5.002.278 €	2.662.188 €	-2.944.521 €	-17.290.152 €	-43.487.708 €	-43.487.708 €
D FINAL P3	-4.425.691 €	-4.425.691 €	0,000 €	-2.467.893 €	-1.029.815 €	-2.476.710 €	889.334 €	-4.299.834 €	-659.961 €	-2.050.232 €	-4.299.815 €	-826.280 €	-4.497.682 €	866.416 €	-4.867.280 €	-7.990.312 €	-7.135.884 €	-7.135.884 €
D FINAL P5	-2.933.909 €	-2.933.909 €	0,000 €	-2.582.037 €	-1.840.558 €	-1.269.751 €	932.700 €	-1.955.379 €	9.734.010 €	3.677.746 €	4.443.321 €	846.657 €	6.241.299 €	1.524.210 €	-10.492.934 €	10.492.934 €	13.677.347 €	13.677.347 €
BALANZA	-19.797.546 €	-19.797.546 €	0,000 €	-12.978.399 €	-3.206.873 €	-2.156.239 €	6.144.695 €	-3.331.210 €	-20.616.443 €	8.074.043 €	1.588.352 €	2.030.218 €	988.703 €	-1.524.514 €	-9.738.224 €	-7.586.536 €	-36.946.245 €	-36.946.245 €
C. INTERMED	8.686.690 €	8.686.690 €	0,000 €	-2.821.144 €	1.429.571 €	4.046.273 €	8.525.613 €	##331.210 €	-39.107.093 €	-3.541.846 €	-6.375.161 €	3.498.801 €	-9.245.055 €	1.102.268 €	-2.533.958 €	-24.360.100 €	-33.962.249 €	-33.962.249 €
D FINAL P3	414.214 €	414.214 €	0,000 €	-3.628.846 €	3.155.225 €	1.015.225 €	2.003.445 €	-6.970.439 €	1.590.011 €	6.217.659 €	1.621.167 €	1.538.505 €	3.256.523 €	1.524.514 €	-2.594.014 €	-2.594.014 €	-5.690.900 €	-5.690.900 €
D FINAL P5	414.214 €	414.214 €	0,000 €	-878.354 €	1.161.057 €	-1.161.057 €	1.244.601 €	-799.279 €	1.370.089 €	1.600.282 €	1.600.282 €	1.600.282 €	3.256.523 €	1.524.514 €	-2.723.315 €	10.035.844 €	13.080.594 €	13.080.594 €
BALANZA	8.818.760 €	8.818.760 €	0,000 €	-6.490.760 €	6.593.345 €	3.900.441 €	11.773.659 €	-6.957.928 €	-34.295.702 €	-1.095.613 €	-5.444.728 €	3.651.777 €	-4.459.027 €	-1.976.637 €	-10.954.979 €	-16.918.271 €	-26.572.555 €	-26.572.555 €
C. INTERMED	10.867.064 €	10.867.064 €	0,000 €	-6.882.261 €	4.419.896 €	4.187.371 €	8.865.953 €	-5.421.895 €	-28.897.438 €	-5.590.330 €	-6.138.726 €	3.685.143 €	-12.414.412 €	-3.667.018 €	-3.477.864 €	-12.475.090 €	-23.620.704 €	-23.620.704 €
D FINAL P3	-563.910 €	-563.910 €	0,000 €	-2.686.905 €	1.099.976 €	760.375 €	1.068.887 €	-3.806.283 €	996.799 €	-1.608.841 €	1.328.591 €	-341.127 €	1.670.020 €	-1.235.430 €	-5.660.294 €	-1.475.930 €	-11.775.752 €	-11.775.752 €
D FINAL P5	105.480 €	105.480 €	0,000 €	-555.978 €	1.098.795 €	-1.489.978 €	1.038.339 €	-7.508.518 €	6.023.764 €	8.753.700 €	75.591 €	1.462.986 €	2.947.713 €	791.203 €	-2.776.737 €	12.881.309 €	15.487.544 €	15.487.544 €
BALANZA	10.408.634 €	10.408.634 €	0,000 €	-3.926.144 €	1.579.971 €	3.462.968 €	10.533.239 €	-9.576.716 €	-20.876.674 €	1.159.329 €	-4.734.544 €	4.807.005 €	-7.996.679 €	-1.914.936 €	-11.914.936 €	9.308.912 €	-9.308.912 €	-9.308.912 €
C. INTERMED	3.658.225 €	3.658.225 €	0,000 €	-1.503.499 €	1.283.594 €	2.759.240 €	5.111.389 €	-3.992.499 €	-21.307.500 €	1.773.615 €	-3.538.528 €	1.308.058 €	-3.888.424 €	-3.365.463 €	-3.991.048 €	-5.080.980 €	-15.898.157 €	-15.898.157 €
D FINAL P3	1.397.705 €	1.397.705 €	0,000 €	-2.463.479 €	4.200.370 €	1.654.681 €	1.154.146 €	-3.148.013 €	2.177.615 €	2.471.358 €	1.283.550 €	-1.289.381 €	893.154 €	-3.640.066 €	-6.087.365 €	8.998.678 €	6.046.678 €	6.046.678 €
D FINAL P5	91.231 €	91.231 €	0,000 €	-740.119 €	1.628.983 €	-1.557.600 €	740.826 €	19.941 €	7.262.972 €	12.164.533 €	273.093 €	518.944 €	3.692.882 €	1.079.460 €	-2.943.050 €	17.006.268 €	19.518.736 €	19.518.736 €
BALANZA	5.147.161 €	5.147.161 €	0,000 €	-4.707.097 €	7.119.947 €	2.856.321 €	7.006.361 €	-7.121.371 €	11.866.913 €	16.387.009 €	-1.981.972 €	57.619 €	497.612 €	-961.652 €	-11.574.164 €	18.012.653 €	9.667.257 €	9.667.257 €
C. INTERMED	2.884.788 €	2.884.788 €	0,000 €	-2.579.358 €	1.038.800 €	3.343.988 €	5.628.610 €	-4.547.162 €	-17.055.140 €	-4.490.085 €	-3.369.306 €	5.059 €	-940.253 €	-2.774.255 €	-6.062.982 €	-8.452.488 €	-18.660.437 €	-18.660.437 €
D FINAL P3	-224.860 €	-224.860 €	0,000 €	-868.309 €	3.697.314 €	1.815.379 €	1.459.943 €	-3.529.187 €	2.384.572 €	7.778.225 €	2.609.962 €	-1.452.464 €	930.964 €	1.060.367 €	-4.097.129 €	4.111.097 €	2.937.937 €	2.937.937 €
D FINAL P5	-333.094 €	-333.094 €	0,000 €	-893.042 €	1.292.199 €	-1.649.667 €	725.889 €	-9.043.522 €	6.143.576 €	10.825.021 €	6.092.533 €	682.743 €	2.182.738 €	1.041.485 €	-3.326.668 €	15.785.516 €	16.635.453 €	16.635.453 €
BALANZA	2.326.834 €	2.326.834 €	0,000 €	-7.140.709 €	6.028.313 €	3.509.610 €	7.814.442 €	-7.884.822 €	-8.527.042 €	7.113.161 €	-156.811 €	-715.662 €	2.173.449 €	-672.403 €	-13.486.579 €	11.444.125 €	912.953 €	912.953 €
C. INTERMED	2.044.154 €	2.044.154 €	0,000 €	-4.874.888 €	1.299.462 €	3.495.917 €	5.918.654 €	-3.794.991 €	-26.321.655 €	-1.283.840 €	-5.242.990 €	147.684 €	-5.364.249 €	-1.276.805 €	-5.159.425 €	-10.710.310 €	-25.561.341 €	-25.561.341 €
D FINAL P3	1.454.608 €	1.454.608 €	0,000 €	-2.836.197 €	4.431.722 €	2.140.434 €	2.006.183 €	-4.287.534 €	1.951.003 €	2.109.197 €	2.024.743 €	-1.459.786 €	735.981 €	603.012 €	-4.407.039 €	6.563.289 €	5.514.808 €	5.514.808 €
D FINAL P5	1.783.061 €	1.783.061 €	0,000 €	-416.055 €	3.551.545 €	-1.305.041 €	913.609 €	-960.997 €	12.743.562 €	6.739.688 €	486.117 €	964.976 €	9.201.761 €	873.644 €	-3.595.133 €	11.551.885 €	21.266.311 €	21.266.311 €
BALANZA	5.281.823 €	5.281.823 €	0,000 €	-8.127.140 €	9.283.729 €	4.331.310 €	8.838.446 €	-9.043.522 €	-11.627.090 €	7.565.045 €	-2.731.530 €	-347.126 €	4.734.993 €	199.851 €	-13.161.597 €	7.404.864 €	1.219.778 €	1.219.778 €
C. INTERMED	3.600.889 €	3.600.889 €	0,000 €	-2.973.389 €	1.212.246 €	2.630.352 €	6.040.724 €	-3.309.044 €	-21.121.964 €	-955.349 €	-5.373.870 €	-186.317 €	-3.339.425 €	-1.408.006 €	-2.855.133 €	-8.714.362 €	-18.476.224 €	-18.476.224 €
D FINAL P3	2.354.189 €	2.354.189 €	0,000 €	-2.579.498 €	4.557.726 €	2.676.502 €	1.912.890 €	-4.219.431 €	8.090.623 €	2.686.237 €	1.320.521 €	-1.577.370 €	1.014.070 €	642.672 €	-3.512.655 €	7.989.622 €	8.231.049 €	8.231.049 €
D FINAL P5	2.265.754 €	2.265.754 €	0,000 €	-705.395 €	3.265.761 €	-998.138 €	1.022.853 €	-319.327 €	3.190.732 €	8.799.424 €	81.805 €	884.858 €	5.225.343 €	448.568 €	-3.866.571 €	13.686.153 €	19.155.910 €	19.155.910 €
BALANZA	8.220.832 €	8.220.832 €	0,000 €	-6.252.282 €	9.035.733 €	3.408.716 €	8.976.467 €	-7.847.802 €	-9.840.209 €	10.530.112 €	-3.971.544 €	-878.829 €	2.699.988 €	-316.766 €	-9.754.359 €	12.911.413 €	8.910.735 €	8.910.735 €
C. INTERMED	9.890.721 €	9.890.721 €	0,000 €	-2.848.729 €	3.609.789 €	3.670.988 €	7.025.169 €	-2.488.406 €	-29.716.226 €	-660.989 €	-5.685.153 €	-865.797 €	-5.092.405 €	-1.448.038 €	-3.624.088 €	-13.661.344 €	-21.396.504 €	-21.396.504 €
D FINAL P3	2.863.553 €	2.863.553 €	0,000 €	-2.775.733 €	4.600.444 €	3.057.577 €	2.634.371 €	-4.653.106 €	702.685 €	1.454.313 €	968.584 €	-1.668.396 €	1.128.819 €	674.794 €	-4.299.400 €	5.352.597 €	5.020.551 €	5.020.551 €
D FINAL P5	2.206.682 €	2.206.682 €	0,000 €	-1.811.536 €	2.473.337 €	-1.340.909 €	1.374.234 €	-473.416 €	7.807.704 €	8.869.758 €	123.078 €	837.573 €	5.287.886 €	536.599 €	-3.993.630 €	13.885.946 €	18.884.144 €	18.884.144 €
BALANZA	14.050.956 €	14.050.956 €	0,000 €	-5.430.926 €	10.683.570 €	5.379.556 €	11.033.774 €	-7.615.018 €	-21.205.837 €	9.663.072 €	-4.593.491 €	-1.696.610 €	3.324.300 €	-236.635 €	-11.917.528 €	5.577.199 €	2.508.191 €	2.508.191 €
C. INTERMED	12.077.770 €	12.077.770 €	0,000 €	-2.098.595 €	5.474.213 €	3.772.804 €	7.533.960 €	-2.534.612 €	-42.742.736 €	-4.059.140 €	-6.953.833 €	-683.320 €	-9.976.176 €	-848.377 €	-10.107.662 €	-23.232.908 €	-34.724.106 €	-34.724.106 €
D FINAL P3	2.796.502 €	2.796.502 €	0,000 €	-2.848.864 €	4.352.180 €	2.544.190 €	3.080.867 €	-4.331.871 €	-145.188 €	-1.06.867 €	652.164 €	-2.075.233 €	2.034.676 €	689.129 €	-4.594.160 €	3.041.869 €	2.544.947 €	2.544.947 €
D FINAL P5	4.283.098 €	4.283.098 €	0,000 €	-15.055 €	5.463.194 €	-1.806.342 €	1.534.028 €	-890.727 €	14.046.072 €	7.450.945 €	48.225 €	881.128 €	12.912.023 €	491.532 €	-4.571.822 €	11.735.031 €	25.779.215 €	25.779.215 €
BALANZA	19.157.370 €	19.157.370 €	0,000 €	-4.962.514 €	15.287.587 €	4.460.652 €	12.148.855 €	-7.777.210 €	-28.841.852 €	3.284.538 €	-6.253.444 €	-1.877.425 €	4.970.523 €	332.284 €	-14.273.244 €	-8.456.008 €	-6.399.944 €	-6.399.944 €
C. INTERMED	13.334.466 €	13.334.466 €	0,000 €	-2.700.961 €	1.320.914 €	5.857.732 €	8.365.610 €	491.171 €	-45.726.319 €	-2.185.912 €	-5.622.180 €	591.261 €	-15.107.372 €	-1.809.550 €	-5.846.368 €	-20.118.022 €	-34.577.765 €	-34.577.765 €
D FINAL P3	4.839.969 €	4.839.969 €	0,000 €	-2.606.308 €	8.454.192 €	3.054.938 €	3.954.938 €	-3.654.938 €	-183.824 €	-590.113 €	1.157.694 €	-1.380.285 €	987.201 €	709.327 €	-4.843.688 €	2.237.586 €	4.068.032 €	4.068.032 €
D FINAL P5	7.938.329 €	7.938.329 €	0,000 €	-582.875 €	6.008.406 €	-1.595.944 €	1.461.330 €	1.481.262 €	12.205.854 €	8.074.660 €	136.287 €	1.267.459 €	11.784.826 €	542.058 €	-5.246.852 €	11.796.736 €	28.218.843 €	28.218.843 €
BALANZA	26.112.764 €	26.112.764 €	0,000 €	-4.724.394 €	12.183.512 €	7.314.122 €	13.022.029 €	-1.682.505 €	-33.702.289 €	5.298.635 €	-4.328.199 €	478.435 €	-2.335.345 €	-558.165 €	-15.576.680 €	-6.083.700 €	-2.290.890 €	-2.290.890 €
C. INTERMED	10.195.552 €	10.195.552 €	0,000 €	-1.253.119 €	1.536.121 €	2.470.541 €	7.319.251 €	-1.895.000 €	-38.008.308 €	2.108.111 €	-5.449.933 €	190.576 €	-12					

### Appendix 5. Calculation of the TiVA EXGRpsH Indicators

SECT	AÑO/PAÍS	ALEMANNI	FRANCIA	ITALIA	PORTUGA	REINO UNII	SUIZA	US	RUSIA	CHINA	ROW	UE	ESPAÑA	UE / ES	REST UE (Z)	NO UE	REST W	TOTAL	TOTAL/ES
	2010	1.876.733 €	2.625.937 €	779.147 €	875.418 €	500.288 €	234.061 €	43.687 €	223.692 €	50.873 €	387.909 €	44.725.532 €	36.611.119 €	8.114.119 €	1.956.704 €	1.349.304 €	684.609 €	46.462.740 €	9.851.332 €
	PORCIENTO10	9,947%	8,087%	4,161%	4,917%	3,755%	2,617%	0,318%	6,453%	0,883%	0,877%	2,427%	2,117%	7,179%	7,779%	1,743%	0,902%	2,366%	4,207%
	2011	2.285.221 €	2.221.534 €	998.924 €	1.007.434 €	31.382 €	320.355 €	90.726 €	496.437 €	133.183 €	651.223 €	45.641.899 €	36.928.842 €	8.713.057 €	2.199.944 €	1.454.622 €	1.033.762 €	47.747.744 €	10.818.904 €
	PORCIENTO11	9,780%	5,978%	3,930%	4,385%	0,277%	2,895%	0,622%	10,932%	1,650%	1,577%	2,497%	2,184%	6,380%	7,965%	1,681%	1,321%	2,442%	4,092%
	2012	2.428.75 €	2.552.80 €	977.11 €	982.98 €	44.63 €	315.79 €	96.38 €	596.50 €	114.54 €	693.78 €	45.495.88 €	36.352.56 €	9.143.312 €	2.201.676 €	1.617.098 €	1.141.040 €	47.804.750 €	11.452.187 €
	PORCIENTO12	9,992%	6,915%	4,279%	4,641%	0,355%	2,916%	0,675%	10,689%	1,449%	1,395%	2,606%	2,253%	6,892%	8,029%	1,781%	1,279%	2,534%	4,195%
	2013	3.217.839 €	3.244.777 €	1.337.945 €	1.260.367 €	62.496 €	468.057 €	88.670 €	733.332 €	162.721 €	997.606 €	48.989.451 €	36.770.191 €	12.219.260 €	3.158.332 €	2.060.684 €	1.543.014 €	52.047.741 €	15.277.550 €
	PORCIENTO13	11,670%	7,753%	6,184%	6,193%	0,576%	5,790%	0,690%	12,943%	2,299%	1,824%	2,872%	8,122%	8,091%	2,520%	2,520%	1,678%	2,826%	5,325%
	2014	3.092.015 €	3.282.192 €	1.270.137 €	1.306.165 €	60.676 €	406.500 €	123.202 €	508.879 €	119.244 €	1.005.061 €	47.365.924 €	35.396.964 €	11.968.960 €	3.018.451 €	1.841.733 €	1.628.287 €	50.212.718 €	14.815.754 €
	PORCIENTO14	10,490%	8,075%	5,996%	6,065%	0,440%	5,300%	0,772%	10,030%	1,620%	2,053%	2,730%	7,619%	7,206%	2,088%	2,088%	1,865%	2,682%	5,035%
	2015	3.420.710 €	3.999.470 €	1.524.064 €	1.315.196 €	62.150 €	482.748 €	140.776 €	66.088 €	166.668 €	1.242.958 €	51.767.251 €	38.222.151 €	13.545.086 €	3.285.646 €	1.710.581 €	2.035.112 €	54.720.700 €	16.498.625 €
	PORCIENTO15	11,450%	9,367%	6,240%	5,924%	0,496%	5,696%	0,717%	7,700%	1,489%	2,499%	2,366%	7,416%	7,416%	1,795%	2,279%	2,844%	5,348%	5,348%
	2016	3.237.224 €	3.901.613 €	1.399.536 €	1.380.252 €	75.628 €	525.260 €	196.162 €	85.790 €	184.256 €	1.393.609 €	52.847.189 €	39.723.324 €	13.123.865 €	3.205.240 €	1.899.945 €	2.226.458 €	56.140.743 €	16.417.419 €
	PORCIENTO16	9,798%	8,718%	5,492%	6,063%	0,791%	5,878%	1,086%	2,794%	1,637%	2,613%	2,920%	2,428%	7,563%	6,750%	2,084%	2,378%	2,873%	5,162%
	2017	3.428.333 €	4.145.915 €	1.564.371 €	1.423.941 €	50.110 €	510.432 €	153.532 €	94.039 €	153.963 €	1.316.334 €	54.408.218 €	40.231.503 €	14.176.715 €	3.614.155 €	1.812.206 €	2.166.464 €	57.536.758 €	17.305.255 €
	PORCIENTO17	9,620%	9,352%	5,476%	5,722%	0,556%	5,943%	0,811%	2,596%	1,250%	2,352%	2,849%	7,433%	6,949%	1,896%	2,187%	2,791%	5,056%	5,056%
	2018	3.418.938 €	4.938.410 €	1.571.832 €	1.391.654 €	107.969 €	500.203 €	72.580 €	77.541 €	228.191 €	1.159.437 €	57.775.238 €	42.746.829 €	15.028.409 €	3.707.575 €	1.860.080 €	2.033.033 €	60.794.755 €	18.047.926 €
	PORCIENTO18	9,866%	8,498%	5,471%	5,999%	1,213%	5,954%	0,312%	2,065%	1,885%	2,302%	2,878%	7,278%	6,640%	1,892%	2,203%	2,819%	5,081%	5,081%
	2019	3.250.046 €	4.994.460 €	1.675.144 €	1.304.867 €	47.919 €	482.472 €	73.131 €	66.156 €	232.086 €	1.065.214 €	57.057.405 €	41.970.623 €	15.086.782 €	3.862.265 €	1.745.149 €	1.908.599 €	59.867.688 €	17.897.145 €
	PORCIENTO19	9,106%	9,137%	5,484%	4,804%	0,520%	4,984%	0,335%	1,727%	1,996%	1,870%	2,325%	7,165%	6,178%	1,800%	1,953%	2,670%	6,705%	4,910%
	2020	3.880.466 €	5.231.697 €	1.565.949 €	1.336.701 €	69.216 €	668.939 €	67.437 €	60.677 €	170.856 €	1.421.229 €	61.059.859 €	45.592.384 €	15.467.475 €	3.452.662 €	1.839.677 €	2.223.781 €	64.320.765 €	18.728.381 €
	PORCIENTO20	10,933%	13,814%	6,027%	5,310%	0,997%	7,414%	0,319%	1,776%	1,261%	2,789%	3,223%	8,448%	5,896%	2,199%	2,683%	3,166%	8,351%	5,881%
	TOTAL	14.553.518 €	27.113.304 €	16.079.324 €	15.275.000 €	4.572.696 €	3.250.668 €	5.271.894 €	2.200.457 €	2.538.643 €	24.540.125 €	405.256.640 €	313.773.987 €	91.482.653 €	18.461.507 €	37.273.942 €	44.079.709 €	467.070.707 €	153.296.720 €
	PORCIENTO10	77,128%	83,498%	85,879%	85,787%	33,944%	36,348%	38,035%	63,481%	44,052%	56,141%	21,995%	18,142%	80,940%	73,390%	48,139%	58,064%	23,786%	65,465%
	2011	18.416.424 €	31.638.194 €	20.078.783 €	20.378.781 €	1.046.220 €	3.837.088 €	6.283.288 €	2.760.940 €	3.638.971 €	23.673.141 €	426.375.692 €	315.382.168 €	110.993.524 €	20.481.342 €	39.138.673 €	45.245.307 €	489.187.506 €	173.805.338 €
	PORCIENTO11	78,812%	85,077%	78,992%	88,707%	9,225%	34,680%	43,084%	60,800%	45,085%	57,313%	23,329%	18,650%	81,274%	74,154%	45,230%	57,832%	25,016%	65,735%
	2012	18.894.407 €	31.133.363 €	18.314.177 €	18.458.029 €	848.228 €	3.244.243 €	6.623.471 €	3.410.532 €	4.136.149 €	28.066.660 €	400.220.552 €	293.136.631 €	107.083.921 €	20.383.945 €	42.179.459 €	51.983.496 €	470.466.671 €	177.330.040 €
	PORCIENTO12	77,735%	84,335%	80,207%	87,139%	6,749%	29,953%	46,359%	61,116%	52,338%	56,605%	22,922%	18,170%	80,170%	73,970%	46,465%	58,285%	24,941%	64,951%
	2013	17.056.665 €	28.584.240 €	17.054.541 €	16.130.887 €	1.021.804 €	4.025.941 €	6.467.256 €	3.731.894 €	4.681.353 €	31.742.588 €	378.596.371 €	276.699.061 €	101.897.310 €	23.070.977 €	46.924.846 €	58.739.186 €	457.263.805 €	180.564.744 €
	PORCIENTO13	61,861%	68,302%	78,825%	79,258%	9,424%	49,802%	50,325%	65,867%	66,154%	58,053%	22,197%	17,92%	67,31%	59,105%	57,379%	63,889%	24,824%	62,936%
	2014	18.529.412 €	27.630.044 €	17.831.796 €	16.593.786 €	1.174.546 €	3.315.526 €	8.873.107 €	3.425.062 €	5.068.257 €	30.232.615 €	383.592.999 €	278.494.991 €	105.098.008 €	24.512.970 €	48.975.941 €	57.352.058 €	462.801.555 €	184.306.564 €
	PORCIENTO14	62,864%	67,978%	75,761%	77,046%	8,527%	43,230%	55,609%	67,511%	68,83%	61,767%	17,646%	66,905%	58,520%	55,522%	65,677%	65,677%	24,716%	62,638%
	2015	17.108.136 €	28.499.158 €	17.421.627 €	16.750.340 €	1.278.926 €	3.573.542 €	12.600.712 €	2.906.646 €	5.671.147 €	32.636.486 €	383.842.314 €	279.784.957 €	104.057.357 €	24.728.096 €	53.860.943 €	60.466.456 €	470.339.743 €	190.554.786 €
	PORCIENTO15	57,568%	66,747%	71,325%	75,448%	10,210%	42,168%	64,222%	74,748%	50,679%	65,619%	21,578%	17,321%	63,642%	54,795%	56,528%	67,698%	24,448%	61,764%
	2016	18.332.644 €	28.915.840 €	18.306.001 €	16.490.015 €	820.195 €	3.678.944 €	11.246.883 €	2.220.900 €	5.727.627 €	34.337.452 €	381.996.569 €	275.895.882 €	106.100.687 €	24.056.187 €	50.572.614 €	61.215.517 €	466.906.635 €	191.010.753 €
	PORCIENTO16	55,485%	64,615%	71,889%	72,431%	8,573%	41,169%	62,246%	72,328%	50,893%	64,375%	21,109%	16,863%	61,145%	55,465%	55,465%	65,386%	23,893%	60,058%
	2017	20.661.390 €	30.472.032 €	20.204.059 €	18.561.872 €	698.181 €	3.503.833 €	11.162.654 €	2.781.114 €	7.251.948 €	36.385.397 €	414.008.153 €	297.712.441 €	116.925.712 €	26.396.359 €	54.332.126 €	65.319.793 €	504.725.676 €	207.013.233 €
	PORCIENTO17	57,979%	61,386%	70,728%	74,593%	7,742%	40,798%	58,982%	76,788%	58,869%	65,009%	21,678%	17,318%	60,972%	50,752%	56,844%	65,927%	24,485%	60,479%
	2018	20.939.235 €	35.294.115 €	19.571.782 €	20.501.416 €	1.344.610 €	3.699.072 €	12.772.632 €	2.838.915 €	7.732.868 €	32.416.401 €	440.291.676 €	314.409.957 €	125.881.979 €	29.575.171 €	57.166.675 €	61.194.979 €	529.874.752 €	215.464.795 €
	PORCIENTO18	57,863%	60,721%	68,118%	75,110%	15,107%	44,033%	54,866%	75,591%	64,347%	21,929%	17,455%	52,964%	60,961%	52,964%	58,138%	66,323%	24,571%	60,606%
	2019	21.078.933 €	35.465.059 €	21.057.401 €	20.153.889 €	854.833 €	3.854.690 €	10.597.226 €	2.788.596 €	7.314.849 €	34.144.816 €	449.944.297 €	317.988.518 €	131.955.779 €	34.700.497 €	51.903.628 €	60.638.250 €	535.992.741 €	218.004.223 €
	PORCIENTO19	59,061%	64,879%	68,940%	74,193%	9,280%	39,817%	48,553%	72,784%	62,900%	59,928%	21,544%	16,933%	62,664%	54,708%	53,546%	62,046%	23,902%	59,811%
	2020	22.488.339 €	33.635.129 €	19.263.155 €	19.463.269 €	940.485 €	4.381.340 €	12.222.881 €	2.746.548 €	10.267.570 €	37.664.674 €	399.374.593 €	291.190.353 €	107.584.240 €	32.734.388 €	48.224.857 €	55.330.774 €	485.264.124 €	193.473.771 €
	PORCIENTO20	63,559%	36,002%	74,146%	77,312%	13,542%	48,561%	57,757%	80,370%	75,809%	73,903%	21,078%	17,047%	58,763%	55,898%	56,061%	66,748%	23,884%	60,447%
	TOTAL	109,933%	138,14%	6,027%	5,310%	0,997%	7,414%	0,319%	1,776%	1,261%	2,789%	3,223%	8,448%						

Appendix 5 (cont). Calculation of the TiVA EXGRpSH Indicators

	2010	40,369 €	63,930 €	28,276 €	88,629 €	21,496 €	13,958 €	249,565 €	56,719 €	40,852 €	909,038 €	194,013,420 €	193,730,017 €	283,403 €	62,199 €	645,486 €	1,171,934 €	195,567,944 €	1,837,927 €
	PORCIENTO10	0,124%	0,197%	0,498%	0,161%	0,156%	1,818%	1,636%	1,636%	0,709%	2,080%	10,530%	11,201%	0,251%	0,247%	0,834%	1,544%	9,959%	0,785%
	2011	69,191 €	87,708 €	24,993 €	77,437 €	18,382 €	15,645 €	76,664 €	73,286 €	53,085 €	877,420 €	158,864,233 €	158,945,258 €	318,975 €	59,646 €	482,299 €	1,122,657 €	160,223,952 €	1,678,694 €
	PORCIENTO11	0,296%	0,260%	0,098%	0,337%	0,162%	0,143%	0,526%	1,614%	0,658%	2,124%	8,692%	9,375%	0,234%	0,216%	0,557%	1,435%	8,194%	0,653%
	2012	42,735 €	84,328 €	23,381 €	49,416 €	27,870 €	15,509 €	73,298 €	71,210 €	34,497 €	806,310 €	131,426,876 €	131,158,183 €	268,693 €	66,633 €	623,762 €	1,207,694 €	132,856,948 €	1,698,765 €
	PORCIENTO12	0,176%	0,229%	0,102%	0,233%	0,222%	0,143%	0,513%	1,276%	0,437%	1,626%	7,527%	8,130%	0,203%	0,250%	0,687%	1,354%	7,043%	0,622%
	2013	83,061 €	197,016 €	20,874 €	60,870 €	31,214 €	19,129 €	48,296 €	92,855 €	24,090 €	679,920 €	116,887,492 €	116,382,157 €	505,335 €	143,514 €	374,558 €	838,894 €	117,941,970 €	1,559,813 €
	PORCIENTO13	0,301%	0,471%	0,096%	0,299%	0,288%	0,237%	0,376%	1,639%	0,340%	1,243%	6,853%	7,484%	0,386%	0,368%	0,458%	0,912%	6,403%	0,548%
	2014	59,603 €	145,932 €	15,429 €	54,127 €	28,781 €	13,303 €	32,339 €	129,123 €	19,646 €	664,980 €	119,232,432 €	118,316,379 €	416,035 €	140,962 €	411,569 €	853,357 €	120,308,981 €	1,492,601 €
	PORCIENTO14	0,202%	0,359%	0,066%	0,251%	0,209%	0,173%	0,203%	2,545%	0,267%	1,359%	6,871%	7,528%	0,265%	0,337%	0,467%	0,977%	6,425%	0,507%
	2015	84,452 €	103,380 €	25,198 €	65,311 €	37,824 €	11,212 €	61,147 €	115,497 €	38,677 €	703,065 €	123,854,667 €	123,344,431 €	510,236 €	231,895 €	449,231 €	887,939 €	125,006,963 €	1,662,533 €
	PORCIENTO15	0,283%	0,442%	0,103%	0,294%	0,302%	0,132%	0,312%	2,970%	0,346%	1,414%	6,963%	7,686%	0,312%	0,523%	0,471%	0,984%	6,498%	0,593%
	2016	110,634 €	154,208 €	42,301 €	82,994 €	63,358 €	27,017 €	65,430 €	88,773 €	48,027 €	775,858 €	125,665,743 €	125,047,524 €	618,219 €	228,082 €	548,376 €	1,031,629 €	126,989,977 €	1,942,453 €
	PORCIENTO16	0,335%	0,345%	0,166%	0,365%	0,362%	0,302%	0,362%	2,891%	0,427%	1,455%	7,643%	7,643%	0,356%	0,480%	0,601%	1,102%	6,498%	0,611%
	2017	98,946 €	160,288 €	37,793 €	81,756 €	116,867 €	36,576 €	75,568 €	14,974 €	57,700 €	833,809 €	137,252,920 €	136,650,845 €	602,075 €	223,292 €	566,241 €	1,098,365 €	138,652,970 €	2,002,125 €
	PORCIENTO17	0,278%	0,323%	0,132%	0,329%	0,426%	0,399%	0,399%	0,413%	0,468%	1,490%	7,187%	7,949%	0,316%	0,429%	0,592%	1,109%	6,726%	0,585%
	2018	152,093 €	207,969 €	42,718 €	94,634 €	77,313 €	50,671 €	114,665 €	22,226 €	61,635 €	669,298 €	149,454,468 €	148,699,064 €	755,404 €	257,990 €	622,232 €	965,020 €	150,745,998 €	2,046,934 €
	PORCIENTO18	0,417%	0,358%	0,149%	0,347%	0,869%	0,603%	0,493%	0,592%	0,509%	1,329%	7,444%	8,255%	0,366%	0,462%	0,633%	1,046%	6,900%	0,576%
	2019	147,033 €	173,163 €	53,264 €	122,257 €	213,258 €	27,871 €	104,736 €	45,668 €	73,684 €	672,636 €	165,755,696 €	165,030,740 €	724,956 €	229,239 €	868,650 €	1,076,069 €	167,296,982 €	2,266,242 €
	PORCIENTO19	0,412%	0,317%	0,174%	0,450%	0,288%	0,480%	0,480%	1,192%	0,634%	1,181%	7,936%	8,788%	0,344%	0,367%	0,896%	1,101%	7,460%	0,622%
	2020	168,358 €	258,954 €	42,049 €	153,000 €	280,493 €	27,780 €	95,299 €	54,533 €	49,967 €	189,543 €	153,167,044 €	152,203,220 €	963,824 €	341,463 €	824,375 €	505,846 €	154,180,962 €	1,977,743 €
	PORCIENTO20	0,474%	0,684%	0,162%	0,608%	0,939%	0,308%	0,450%	1,596%	0,369%	0,372%	8,084%	8,892%	0,526%	0,583%	0,958%	0,610%	7,589%	0,618%
	TOTAL													0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €
	2010	945,750 €	625,231 €	212,700 €	542,336 €	683,450 €	3,149,494 €	979,814 €	49,350 €	613,346 €	6,385,202 €	190,421,028 €	186,600,990 €	3,820,038 €	1,494,021 €	7,942,645 €	8,852,393 €	204,748,875 €	18,147,885 €
	PORCIENTO10	5,012%	1,925%	2,897%	1,195%	5,129%	35,217%	7,137%	1,424%	10,643%	14,608%	10,335%	10,789%	3,380%	5,939%	10,258%	11,661%	10,427%	7,750%
	2011	813,256 €	689,045 €	3,107,152 €	233,644 €	1,051,602 €	4,649,269 €	878,605 €	43,347 €	855,329 €	3,604,428 €	191,946,133 €	185,869,625 €	6,076,508 €	1,233,411 €	11,416,331 €	7,318,607 €	206,722,892 €	20,853,267 €
	PORCIENTO11	3,480%	1,853%	12,224%	1,017%	9,272%	42,020%	6,025%	0,955%	10,349%	8,136%	10,502%	10,991%	4,466%	4,466%	13,193%	9,355%	10,571%	7,887%
	2012	982,723 €	959,677 €	2,459,133 €	334,319 €	1,490,424 €	4,542,048 €	730,797 €	42,468 €	356,893 €	5,152,040 €	185,804,293 €	179,687,523 €	6,116,770 €	1,380,918 €	10,732,526 €	8,721,936 €	201,688,859 €	22,001,336 €
	PORCIENTO12	4,043%	2,600%	10,770%	1,578%	11,858%	41,935%	5,115%	0,761%	4,516%	10,391%	10,642%	11,138%	4,611%	5,036%	11,823%	9,779%	10,692%	8,059%
	2013	1,959,208 €	3,279,164 €	1,223,170 €	855,311 €	3,992,559 €	1,743,335 €	1,155,444 €	161,150 €	289,711 €	10,393,036 €	181,460,736 €	169,477,812 €	11,982,924 €	4,666,071 €	8,837,181 €	11,888,018 €	200,690,953 €	31,213,141 €
	PORCIENTO13	7,106%	7,838%	5,653%	4,203%	36,825%	8,991%	2,844%	0,094%	4,094%	19,007%	10,639%	10,898%	7,965%	11,954%	10,806%	12,930%	10,895%	10,879%
	2014	2,492,108 €	2,893,659 €	2,218,648 €	882,825 €	6,195,917 €	1,957,448 €	2,110,231 €	181,867 €	401,371 €	5,598,426 €	185,453,359 €	171,164,723 €	14,288,636 €	5,801,396 €	12,398,169 €	7,149,761 €	203,449,954 €	32,285,231 €
	PORCIENTO14	8,455%	7,119%	9,426%	4,099%	44,981%	25,522%	13,225%	3,585%	5,454%	11,438%	10,687%	10,845%	9,096%	13,850%	14,055%	8,188%	10,865%	10,972%
	2015	3,868,287 €	3,121,560 €	2,927,972 €	1,146,744 €	4,346,942 €	2,320,999 €	467,047 €	73,202 €	3,320,251 €	3,792,906 €	195,425,416 €	177,171,889 €	18,253,527 €	7,188,964 €	12,267,585 €	9,801,782 €	7,130,427 €	232,750,957 €
	PORCIENTO15	12,949%	7,311%	11,987%	5,165%	34,720%	27,388%	2,380%	1,882%	29,671%	7,626%	10,986%	10,968%	11,164%	16,225%	12,875%	6,191%	10,993%	11,122%
	2016	5,676,026 €	4,157,533 €	3,081,766 €	1,649,914 €	2,317,803 €	2,311,111 €	778,157 €	155,163 €	2,949,641 €	4,289,535 €	209,386,725 €	185,049,755 €	24,336,970 €	9,771,731 €	10,646,667 €	6,424,327 €	224,322,927 €	39,273,172 €
	PORCIENTO16	17,179%	9,206%	12,094%	7,247%	24,227%	25,862%	4,307%	5,053%	26,209%	8,042%	11,571%	11,310%	14,025%	20,579%	11,677%	6,862%	11,479%	12,348%
	2017	5,265,668 €	6,224,305 €	3,619,297 €	1,686,413 €	1,685,752 €	2,212,396 €	918,225 €	129,888 €	1,863,835 €	4,138,741 €	218,810,434 €	191,278,895 €	27,531,539 €	10,735,856 €	9,801,782 €	7,130,427 €	232,750,957 €	41,472,062 €
	PORCIENTO17	14,776%	12,539%	12,670%	6,777%	18,693%	25,760%	4,852%	3,586%	15,130%	7,395%	11,457%	11,127%	14,434%	20,642%	10,255%	7,197%	11,291%	12,116%
	2018	5,877,782 €	8,388,415 €	4,105,643 €	2,085,253 €	1,325,587 €	2,006,897 €	734,725 €	85,713 €	787,314 €	4,065,038 €	229,386,858 €	198,047,592 €	31,339,266 €	10,882,173 €	7,136,081 €	6,260,888 €	240,587,977 €	42,540,385 €
	PORCIENTO18	16,102%	14,432%	14,289%	7,640%	14,893%	23,889%	3,156%	2,282%	6,505%	8,069%	11,425%	10,995%	15,177%	19,488%	7,257%	6,786%	11,566%	11,976%
	2019	5,019,495 €	4,680,530 €	4,180,815 €	2,335,249 €	1,677,395 €	2,752,014 €	1,170,473 €	87,469 €	665,627 €	7,166,145 €	232,739,664 €	204,865,475 €	27,874,189 €	11,658,100 €	9,555,116 €	10,368,283 €	249,460,925 €	44,595,450 €
	PORCIENTO19	14,064%	8,562%	13,688%	8,597%	18,210%	28,427%	5,363%	2,283%	5,749%	12,577%	11,144%	10,909%	13,237%	18,649%	9,857%	10,609%	11,125%	12,232%
	2020	4,040,007 €	6,934,739 €	2,763,138 €	1,517,332 €	1,551,572 €	1,831,509 €	776,016 €	70,806 €	631,697 €	2,531,218 €	206,815,132 €	180,339,228 €	25,975,904 €	10,720,688 €	9,656,622 €	7,326,240 €	219,002,972 €	38,163,744 €
	PORCIENTO20	11,382%	18,311%	10,656%	6,027%	22,341%	20,300%	3,667%	2,072%	4,664%	14,967%	10,915%	10,565%	14,188%	18,307%	11,266%	8,838%	10,779%	11,924%
	TOTAL													0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €

Appendix 5 (cont). Calculation of the TiVA EXGRpSH Indicators

	2010	5,517 €	11,281 €	8,950 €	5,744 €	2,070,848 €	200,772 €	531,017 €	157,645 €	283,375 €	508,462 €	99,443,449 €	99,368,561 €	74,888 €	43,396 €	4,449,003 €	1,713,858 €	104,400,914 €	5,032,353 €
	PORCIENTO10	0,02%	0,03%	0,04%	0,03%	2,24%	3,86%	4,91%	5,45%	0,66%	0,73%	0,17%	0,17%	0,06%	0,17%	5,74%	2,58%	2,58%	2,48%
	2011	6,029 €	11,624 €	12,705 €	5,742 €	2,951,407 €	243,352 €	582,088 €	255,900 €	365,823 €	588,727 €	99,233,857 €	99,152,485 €	70,872 €	34,798 €	5,097,988 €	1,947,998 €	104,909,934 €	5,757,449 €
	PORCIENTO11	0,02%	0,03%	0,05%	0,02%	20,20%	2,19%	3,91%	5,63%	4,52%	1,42%	5,42%	5,86%	0,05%	0,12%	5,81%	2,49%	5,36%	2,17%
	2012	6,871 €	12,952 €	10,788 €	6,184 €	2,477,701 €	289,899 €	651,939 €	286,283 €	423,873 €	597,190 €	96,548,538 €	96,487,426 €	61,112 €	24,317 €	5,325,219 €	1,792,714 €	102,470,947 €	5,983,521 €
	PORCIENTO12	0,02%	0,03%	0,04%	0,02%	19,713%	2,67%	4,56%	5,30%	5,36%	1,20%	5,50%	5,91%	0,08%	0,09%	5,86%	2,01%	5,42%	2,19%
	2013	705,604 €	698,272 €	148,616 €	123,367 €	1,141,300 €	1,200,050 €	230,355 €	159,487 €	162,469 €	762,490 €	95,294,288 €	92,924,288 €	2,304,429 €	628,570 €	4,425,761 €	1,374,590 €	98,416,968 €	5,492,680 €
	PORCIENTO13	2,55%	1,65%	0,68%	0,60%	10,52%	1,48%	1,79%	2,81%	2,29%	1,39%	5,58%	5,97%	1,52%	2,96%	2,66%	1,49%	5,43%	1,91%
	2014	670,644 €	697,341 €	165,686 €	122,886 €	1,215,094 €	1,102,224 €	228,195 €	134,434 €	195,045 €	829,065 €	97,005,884 €	94,708,771 €	2,297,113 €	640,556 €	2,547,050 €	1,493,123 €	100,381,999 €	5,673,228 €
	PORCIENTO14	2,47%	1,71%	0,70%	0,57%	8,82%	1,43%	1,47%	2,65%	2,65%	1,69%	5,90%	6,01%	1,46%	1,52%	2,87%	1,71%	5,36%	1,92%
	2015	747,633 €	703,131 €	180,390 €	114,657 €	1,268,708 €	1,124,543 €	370,343 €	91,567 €	234,293 €	898,250 €	101,971,464 €	99,571,464 €	2,400,000 €	654,189 €	2,761,256 €	1,582,142 €	105,630,970 €	6,059,506 €
	PORCIENTO15	2,60%	1,64%	0,73%	0,51%	10,12%	1,37%	1,88%	2,35%	2,09%	1,80%	5,73%	6,16%	1,48%	1,47%	2,89%	1,77%	5,49%	1,96%
	2016	749,522 €	686,308 €	189,974 €	113,819 €	1,321,334 €	1,27,616 €	401,944 €	86,438 €	236,678 €	983,394 €	108,223,827 €	105,762,957 €	2,460,870 €	721,247 €	2,897,753 €	1,707,137 €	112,104,974 €	6,342,017 €
	PORCIENTO16	2,68%	1,53%	0,74%	0,50%	13,81%	1,42%	2,22%	2,81%	2,10%	1,84%	5,90%	6,44%	1,41%	1,51%	3,17%	1,82%	5,73%	1,99%
	2017	876,295 €	739,332 €	219,389 €	120,258 €	1,362,288 €	1,32,242 €	413,912 €	93,465 €	284,432 €	1,133,580 €	116,325,585 €	113,491,639 €	2,833,946 €	878,472 €	3,045,831 €	1,893,072 €	120,504,996 €	7,013,357 €
	PORCIENTO17	2,45%	1,49%	0,76%	0,48%	15,10%	1,54%	2,18%	2,58%	2,30%	2,02%	6,09%	6,20%	1,48%	1,68%	3,18%	1,91%	5,84%	2,04%
	2018	853,673 €	791,261 €	221,309 €	124,786 €	1,254,612 €	1,15,275 €	772,366 €	183,243 €	369,819 €	989,471 €	119,929,575 €	117,069,507 €	2,860,068 €	869,039 €	3,488,918 €	1,783,074 €	124,407,964 €	7,338,457 €
	PORCIENTO18	2,39%	1,36%	0,70%	0,45%	14,09%	1,37%	3,31%	4,87%	3,05%	1,94%	5,97%	6,49%	1,38%	1,55%	3,54%	1,93%	5,76%	2,06%
	2019	874,416 €	803,846 €	244,944 €	141,966 €	1,304,208 €	1,17,323 €	938,740 €	186,329 €	352,408 €	1,258,558 €	125,922,909 €	122,897,957 €	3,024,952 €	959,780 €	3,659,510 €	2,019,000 €	130,840,977 €	7,943,020 €
	PORCIENTO19	2,45%	1,47%	0,80%	0,52%	14,15%	1,21%	4,30%	4,86%	3,03%	2,09%	6,02%	6,54%	1,43%	1,53%	3,77%	2,06%	5,83%	2,17%
	2020	483,335 €	943,480 €	102,680 €	86,600 €	559,835 €	64,860 €	480,292 €	60,142 €	127,067 €	425,317 €	72,276,650 €	69,991,304 €	2,285,346 €	669,251 €	1,718,995 €	852,116 €	74,420,962 €	4,429,658 €
	PORCIENTO20	1,36%	2,49%	0,39%	0,34%	8,06%	0,71%	2,27%	1,76%	0,98%	0,83%	3,81%	4,08%	1,24%	1,43%	1,98%	1,02%	3,66%	1,38%
	TOTAL	4,351 €	5,413 €	5,266 €	1,655 €	15,853 €	1,603 €	19,877 €	2,536 €	3,443 €	23,033 €	128,115,075 €	128,089,654 €	25,421 €	8,736 €	5,4814 €	34,535 €	128,192,922 €	103,268 €
	PORCIENTO10	0,02%	0,01%	0,02%	0,00%	0,11%	0,01%	0,14%	0,07%	0,06%	0,05%	6,95%	7,40%	0,02%	0,03%	0,07%	0,04%	6,52%	0,04%
	2011	6,827 €	8,209 €	4,088 €	2,619 €	24,635 €	1,873 €	24,085 €	3,079 €	5,793 €	38,654 €	132,515,339 €	132,481,998 €	33,341 €	11,588 €	91,964 €	71,153 €	132,645,957 €	163,959 €
	PORCIENTO11	0,02%	0,02%	0,01%	0,01%	0,16%	0,01%	0,16%	0,06%	0,07%	0,09%	7,25%	7,83%	0,02%	0,04%	0,10%	0,09%	6,78%	0,06%
	2012	9,955 €	7,693 €	3,292 €	2,486 €	36,957 €	3,894 €	27,620 €	3,968 €	8,633 €	60,160 €	135,723,491 €	135,687,358 €	36,133 €	12,707 €	126,294 €	105,382 €	135,909,945 €	222,587 €
	PORCIENTO12	0,04%	0,02%	0,01%	0,01%	0,29%	0,03%	0,19%	0,07%	0,10%	0,12%	7,77%	8,41%	0,02%	0,04%	0,13%	0,11%	7,20%	0,08%
	2013	44,603 €	46,100 €	14,993 €	9,911 €	44,705 €	8,117 €	38,860 €	5,586 €	7,281 €	59,002 €	135,066,287 €	135,427,530 €	178,757 €	63,150 €	148,668 €	103,121 €	135,813,957 €	386,427 €
	PORCIENTO13	0,16%	0,11%	0,06%	0,04%	0,41%	0,10%	0,30%	0,09%	0,10%	0,11%	7,95%	8,70%	0,11%	0,16%	0,18%	0,12%	7,37%	0,13%
	2014	59,748 €	57,409 €	19,661 €	16,246 €	48,391 €	10,771 €	39,393 €	6,718 €	11,024 €	95,647 €	134,767,650 €	134,524,335 €	243,315 €	90,251 €	188,661 €	168,011 €	135,051,958 €	527,623 €
	PORCIENTO14	0,20%	0,14%	0,08%	0,07%	0,35%	0,14%	0,24%	0,13%	0,15%	0,19%	7,76%	8,52%	0,15%	0,21%	0,21%	0,19%	7,21%	0,17%
	2015	31,344 €	38,529 €	14,369 €	13,726 €	33,457 €	6,167 €	44,070 €	8,353 €	5,505 €	53,093 €	133,640,824 €	133,469,913 €	170,911 €	72,943 €	139,087 €	94,628 €	133,833,004 €	363,091 €
	PORCIENTO15	0,10%	0,09%	0,05%	0,06%	0,26%	0,07%	0,22%	0,15%	0,04%	0,04%	7,51%	8,26%	0,10%	0,16%	0,16%	0,10%	6,95%	0,11%
	2016	18,041 €	27,380 €	10,657 €	12,735 €	26,961 €	5,398 €	22,353 €	0,975 €	2,536 €	23,304 €	135,659,478 €	135,546,784 €	112,694 €	43,881 €	79,183 €	44,264 €	135,761,965 €	215,181 €
	PORCIENTO16	0,05%	0,06%	0,04%	0,05%	0,28%	0,06%	0,12%	0,03%	0,02%	0,04%	7,49%	8,28%	0,05%	0,09%	0,08%	0,07%	6,94%	0,06%
	2017	16,637 €	32,350 €	10,762 €	11,750 €	30,175 €	4,311 €	29,094 €	0,567 €	2,670 €	21,614 €	139,719,518 €	139,605,814 €	113,704 €	42,205 €	82,833 €	37,630 €	139,823,965 €	218,151 €
	PORCIENTO17	0,04%	0,06%	0,03%	0,04%	0,35%	0,05%	0,15%	0,01%	0,02%	0,03%	7,24%	8,07%	0,06%	0,08%	0,08%	0,03%	6,75%	0,06%
	2018	19,357 €	35,009 €	12,374 €	12,904 €	31,586 €	4,170 €	25,066 €	0,451 €	4,139 €	18,500 €	145,483,923 €	145,357,947 €	125,976 €	46,232 €	82,518 €	35,606 €	145,584,941 €	226,994 €
	PORCIENTO18	0,05%	0,06%	0,04%	0,04%	0,38%	0,05%	0,15%	0,01%	0,02%	0,03%	7,16%	8,12%	0,06%	0,08%	0,08%	0,03%	6,78%	0,06%
	2019	16,698 €	28,937 €	7,421 €	10,256 €	21,859 €	13,812 €	19,655 €	1,061 €	5,058 €	47,752 €	152,440,119 €	152,343,114 €	97,005 €	33,693 €	95,061 €	81,368 €	152,582,932 €	239,818 €
	PORCIENTO19	0,04%	0,05%	0,02%	0,03%	0,43%	0,09%	0,28%	0,02%	0,03%	0,04%	7,29%	8,12%	0,04%	0,05%	0,05%	0,08%	6,80%	0,06%
	2020	16,037 €	45,384 €	6,322 €	8,663 €	22,821 €	11,413 €	20,210 €	0,791 €	5,534 €	35,515 €	151,894,711 €	151,78,064 €	116,647 €	40,341 €	92,741 €	67,487 €	152,022,967 €	244,903 €
	PORCIENTO20	0,04%	0,12%	0,02%	0,03%	0,32%	0,12%	0,09%	0,02%	0,04%	0,07%	8,01%	8,67%	0,06%	0,06%	0,10%	0,08%	7,48%	0,07%
	TOTAL	0,04%	0,12%	0,02%	0,03%	0,32%	0,12%	0,09%	0,02%	0,04%	0,07%	8,01%	8,67%	0,06%	0,06%	0,10%	0,08%	7,48%	0,07%

Appendix 5 (cont). Calculation of the TiVA EXGRpSH Indicators

	2010	33,743 €	32,757 €	17,363 €	18,729 €	107,959 €	37,172 €	107,954 €	19,219 €	61,259 €	607,190 €	88,481,162 €	88,312,828 €	168,334 €	65,742 €	537,625 €	811,252 €	89,625,977 €	1,313,149 €
	PORCIENTO10	0,179%	0,101%	0,093%	0,105%	0,810%	0,786%	0,786%	0,554%	1,063%	1,389%	4,802%	5,106%	1,489%	0,261%	0,694%	1,069%	4,564%	0,561%
	2011	36,929 €	37,395 €	16,732 €	18,632 €	125,629 €	35,089 €	109,975 €	25,464 €	80,189 €	695,522 €	88,290,116 €	88,113,405 €	176,711 €	67,023 €	619,387 €	938,563 €	89,605,025 €	1,491,620 €
	PORCIENTO11	0,159%	0,101%	0,066%	0,081%	1,108%	0,317%	0,754%	0,561%	0,993%	1,684%	4,831%	5,210%	0,129%	0,243%	0,716%	1,200%	4,582%	0,564%
	2012	31,505 €	34,381 €	14,595 €	19,186 €	147,661 €	54,015 €	99,570 €	32,478 €	73,417 €	769,170 €	83,331,789 €	83,331,789 €	169,933 €	70,056 €	686,085 €	1,048,114 €	84,956,388 €	1,625,188 €
	PORCIENTO12	0,130%	0,094%	0,064%	0,091%	1,175%	0,499%	0,697%	0,582%	0,929%	1,551%	4,783%	5,165%	0,128%	0,255%	0,756%	1,175%	4,504%	0,593%
	2013	101,677 €	144,754 €	33,854 €	33,439 €	117,991 €	41,442 €	82,951 €	24,494 €	62,083 €	593,027 €	83,744,218 €	83,223,009 €	521,209 €	207,485 €	601,719 €	865,785 €	84,938,964 €	1,715,955 €
	PORCIENTO13	0,359%	0,346%	0,156%	0,164%	1,088%	0,513%	0,645%	0,432%	0,877%	1,085%	4,910%	5,351%	0,346%	0,532%	0,736%	0,942%	4,611%	0,598%
	2014	95,522 €	141,070 €	42,437 €	39,254 €	122,487 €	38,543 €	71,172 €	24,765 €	41,885 €	592,107 €	83,565,457 €	83,030,045 €	535,412 €	217,129 €	591,432 €	884,687 €	84,748,996 €	1,718,951 €
	PORCIENTO14	0,324%	0,347%	0,180%	0,182%	0,889%	0,503%	0,446%	0,488%	0,569%	1,210%	4,816%	5,611%	0,341%	0,518%	0,670%	1,013%	4,526%	0,584%
	2015	93,501 €	139,767 €	44,727 €	38,030 €	139,104 €	34,604 €	89,917 €	19,678 €	46,349 €	602,683 €	84,753,565 €	84,227,344 €	526,221 €	210,196 €	618,734 €	891,765 €	85,974,968 €	1,747,638 €
	PORCIENTO15	0,313%	0,327%	0,183%	0,171%	1,111%	0,408%	0,458%	0,506%	0,414%	1,212%	4,765%	5,214%	0,322%	0,474%	0,649%	0,988%	4,489%	0,568%
	2016	87,409 €	145,139 €	43,487 €	63,091 €	123,766 €	36,298 €	81,267 €	15,661 €	64,123 €	605,171 €	84,259,652 €	83,681,733 €	577,919 €	238,793 €	659,153 €	943,209 €	85,523,976 €	1,842,243 €
	PORCIENTO16	0,265%	0,324%	0,171%	0,277%	1,294%	0,406%	0,450%	0,510%	0,570%	1,135%	4,656%	5,115%	0,333%	0,503%	0,723%	1,007%	4,376%	0,579%
	2017	110,612 €	164,445 €	55,232 €	67,195 €	127,924 €	31,349 €	95,889 €	16,965 €	90,618 €	723,703 €	84,129,282 €	83,462,351 €	666,931 €	269,447 €	599,016 €	959,974 €	85,452,001 €	1,989,650 €
	PORCIENTO17	0,310%	0,331%	0,193%	0,270%	1,419%	0,365%	0,507%	0,468%	0,736%	1,293%	4,405%	4,855%	0,350%	0,518%	0,627%	0,969%	4,145%	0,581%
	2018	113,659 €	200,706 €	55,851 €	61,805 €	120,113 €	33,947 €	132,376 €	17,586 €	84,868 €	655,950 €	86,329,949 €	86,129,974 €	699,975 €	267,944 €	691,111 €	958,171 €	88,177,010 €	2,047,036 €
	PORCIENTO18	0,311%	0,345%	0,194%	0,226%	1,349%	0,404%	0,569%	0,468%	0,701%	1,302%	4,325%	4,782%	0,339%	0,480%	0,703%	1,038%	4,089%	0,576%
	2019	123,619 €	190,508 €	64,998 €	61,256 €	114,899 €	40,102 €	131,729 €	20,256 €	77,360 €	760,924 €	90,124,640 €	89,402,822 €	721,818 €	281,437 €	632,402 €	1,008,980 €	91,517,966 €	2,115,344 €
	PORCIENTO19	0,346%	0,349%	0,213%	0,226%	1,247%	0,414%	0,604%	0,529%	0,665%	1,336%	4,315%	4,761%	0,343%	0,450%	0,652%	1,032%	4,081%	0,580%
	2020	102,401 €	271,314 €	45,137 €	56,693 €	78,531 €	42,353 €	115,562 €	13,578 €	90,343 €	671,775 €	93,549,303 €	92,803,481 €	745,822 €	270,277 €	566,926 €	898,334 €	94,788,004 €	1,984,523 €
	PORCIENTO20	0,289%	0,716%	0,174%	0,225%	1,131%	0,469%	0,546%	0,397%	0,667%	1,318%	4,937%	5,422%	0,407%	0,462%	0,659%	1,084%	4,665%	0,620%
	TOTAL	1,091 €	-5,951 €	0,865 €	0,877 €	19,040 €	3,781 €	352,654 €	3,644 €	4,307 €	18,732 €	63,092,436 €	63,093,085 €	-0,649 €	2,469 €	413,709 €	49,015 €	63,524,877 €	431,797 €
	PORCIENTO10	0,006%	-0,018%	0,005%	0,005%	0,143%	0,042%	2,569%	0,105%	0,075%	0,043%	3,424%	3,648%	-0,001%	0,010%	0,534%	0,065%	3,235%	0,184%
	2011	1,772 €	-1,523 €	2,718 €	1,593 €	26,679 €	5,654 €	393,111 €	7,808 €	6,893 €	25,128 €	62,352,833 €	62,344,733 €	8,100 €	3,540 €	479,955 €	62,938 €	62,857,916 €	513,183 €
	PORCIENTO11	0,008%	-0,004%	0,011%	0,007%	0,253%	0,051%	2,696%	0,172%	0,085%	0,061%	3,412%	3,687%	0,006%	0,013%	0,555%	0,080%	3,214%	0,194%
	2012	2,266 €	-921 €	2,856 €	2,119 €	29,285 €	10,213 €	412,566 €	14,925 €	8,467 €	35,488 €	60,354,326 €	60,343,549 €	10,777 €	4,457 €	521,133 €	81,165 €	60,910,947 €	567,398 €
	PORCIENTO12	0,009%	-0,002%	0,013%	0,010%	0,233%	0,094%	2,888%	0,267%	0,107%	0,072%	3,457%	3,740%	0,008%	0,016%	0,574%	0,091%	3,229%	0,208%
	2013	21,142 €	-25,470 €	7,884 €	4,682 €	18,084 €	5,118 €	382,024 €	10,418 €	5,844 €	29,175 €	59,755,681 €	59,726,728 €	28,953 €	20,915 €	449,032 €	56,719 €	60,233,888 €	507,160 €
	PORCIENTO13	0,077%	-0,061%	0,036%	0,023%	0,167%	0,063%	2,973%	0,184%	0,083%	0,053%	3,504%	3,841%	0,019%	0,019%	0,549%	0,062%	3,270%	0,177%
	2014	31,056 €	27,796 €	9,840 €	5,627 €	25,730 €	9,646 €	298,757 €	8,977 €	7,615 €	35,438 €	59,980,446 €	59,876,935 €	103,511 €	29,152 €	380,057 €	64,770 €	60,395,941 €	519,006 €
	PORCIENTO14	0,105%	0,068%	0,042%	0,026%	0,187%	0,126%	1,872%	0,177%	0,103%	0,072%	3,456%	3,794%	0,066%	0,070%	0,431%	0,074%	3,225%	0,176%
	2015	21,785 €	-21,697 €	7,998 €	5,310 €	21,679 €	4,310 €	433,137 €	3,157 €	8,152 €	20,387 €	61,748,656 €	61,715,826 €	32,830 €	19,436 €	490,871 €	40,823 €	62,259,914 €	544,086 €
	PORCIENTO15	0,073%	-0,051%	0,033%	0,024%	0,173%	0,051%	2,208%	0,081%	0,073%	0,041%	3,821%	3,471%	0,020%	0,044%	0,515%	0,046%	3,236%	0,176%
	2016	23,416 €	-7,123 €	7,185 €	3,974 €	26,378 €	6,612 €	308,984 €	4,093 €	9,460 €	26,147 €	63,695,032 €	63,646,857 €	48,175 €	20,723 €	380,729 €	51,349 €	64,101,908 €	455,051 €
	PORCIENTO16	0,071%	-0,016%	0,028%	0,017%	0,276%	0,074%	1,710%	0,133%	0,084%	0,049%	3,890%	3,890%	0,028%	0,044%	0,418%	0,055%	3,280%	0,143%
	2017	27,168 €	7,711 €	8,374 €	4,217 €	25,532 €	5,978 €	305,926 €	4,300 €	11,072 €	27,012 €	65,716,328 €	65,644,504 €	71,824 €	24,354 €	381,566 €	55,770 €	66,124,906 €	480,407 €
	PORCIENTO17	0,076%	0,016%	0,029%	0,017%	0,283%	0,070%	1,616%	0,119%	0,090%	0,048%	3,441%	3,819%	0,038%	0,047%	0,399%	0,056%	3,208%	0,140%
	2018	14,599 €	-72,507 €	5,895 €	3,072 €	15,259 €	3,551 €	446,842 €	2,697 €	5,949 €	15,633 €	66,868,732 €	66,901,898 €	-33,166 €	16,275 €	487,560 €	28,895 €	67,371,925 €	470,027 €
	PORCIENTO18	0,040%	-0,125%	0,019%	0,011%	0,171%	0,042%	1,919%	0,072%	0,049%	0,031%	3,330%	3,714%	-0,016%	0,029%	0,496%	0,031%	3,124%	0,132%
	2019	13,865 €	-91,577 €	5,074 €	3,079 €	12,127 €	3,803 €	474,696 €	2,499 €	5,244 €	17,405 €	68,251,976 €	68,305,430 €	-53,544 €	16,105 €	510,551 €	29,587 €	68,779,932 €	474,507 €
	PORCIENTO19	0,039%	-0,168%	0,017%	0,011%	0,132%	0,039%	2,175%	0,065%	0,045%	0,031%	3,268%	3,637%	-0,025%	0,027%	0,527%	0,030%	3,067%	0,130%
	2020	12,983 €	-65,304 €	3,852 €	3,177 €	11,653 €	3,815 €	432,086 €	1,416 €	2,889 €	12,589 €	69,241,921 €	69,166,036 €	-24,115 €	21,177 €	464,411 €	25,141 €	69,718,921 €	452,885 €
	PORCIENTO20	0,037%	-0,172%	0,015%	0,013%	0,168%	0,042%	2,042%	0,041%	0,021%	0,025%	3,654%	4,047%	-0,013%	0,036%	0,540%	0,030%	3,432%	0,141%
	TOTAL	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €	0,000 €



Appendix 5 (cont). Calculation of the TiVA EXGRpSH Indicators

2010	11.546 €	7.442 €	6.970 €	9.694 €	9.563 €	7.876 €	78.337 €	0.776 €	1.070 €	18.536 €	94.434.721 €	94.383.399 €	51.322 €	15.670 €	116.553 €	37.467 €	94.569.810 €	186.411 €
PORCIENTO10	0,065%	0,023%	0,037%	0,054%	0,072%	0,088%	0,571%	0,022%	0,019%	0,042%	5,125%	5,457%	0,045%	0,062%	0,151%	0,049%	4,816%	0,080%
2011	12.465 €	10.228 €	11.537 €	11.673 €	15.317 €	7.833 €	60.005 €	0.982 €	1.180 €	26.918 €	95.225.048 €	95.158.588 €	66.460 €	20.557 €	111.822 €	53.423 €	95.363.788 €	205.200 €
PORCIENTO11	0,053%	0,028%	0,045%	0,051%	0,135%	0,071%	0,411%	0,022%	0,015%	0,065%	5,210%	5,627%	0,049%	0,074%	0,129%	0,068%	4,877%	0,078%
2012	10.978 €	7.611 €	7.092 €	10.661 €	15.085 €	7.715 €	65.384 €	0.884 €	0.944 €	26.465 €	92.711.268 €	92.652.465 €	58.803 €	22.461 €	116.056 €	52.509 €	92.853.789 €	201.324 €
PORCIENTO12	0,045%	0,021%	0,031%	0,050%	0,120%	0,071%	0,458%	0,016%	0,012%	0,053%	5,310%	5,743%	0,044%	0,082%	0,128%	0,059%	4,922%	0,074%
2013	5.893 €	2.327 €	3.129 €	22.922 €	12.871 €	3.249 €	57.498 €	0.799 €	1.171 €	23.660 €	91.329.328 €	91.278.103 €	51.225 €	16.954 €	114.771 €	62.843 €	91.467.759 €	189.656 €
PORCIENTO13	0,021%	0,006%	0,014%	0,113%	0,119%	0,040%	0,447%	0,014%	0,017%	0,043%	5,355%	5,869%	0,034%	0,043%	0,140%	0,068%	4,966%	0,065%
2014	8.921 €	41.724 €	4.716 €	10.521 €	14.993 €	4.171 €	49.836 €	0.920 €	0.784 €	11.709 €	91.660.187 €	91.576.813 €	88.374 €	17.492 €	101.921 €	42.920 €	91.779.811 €	196.998 €
PORCIENTO14	0,030%	0,103%	0,020%	0,049%	0,109%	0,054%	0,312%	0,018%	0,011%	0,024%	5,282%	5,802%	0,053%	0,042%	0,116%	0,049%	4,901%	0,067%
2015	6.054 €	42.002 €	12.906 €	12.134 €	8.724 €	3.010 €	59.766 €	0.498 €	1.621 €	15.709 €	96.470.771 €	96.382.468 €	88.303 €	15.207 €	98.256 €	40.346 €	96.584.736 €	202.268 €
PORCIENTO15	0,020%	0,098%	0,063%	0,055%	0,070%	0,036%	0,305%	0,013%	0,014%	0,032%	5,423%	5,967%	0,054%	0,034%	0,103%	0,045%	5,020%	0,065%
2016	27.140 €	17.192 €	17.607 €	28.309 €	14.772 €	6.384 €	42.659 €	0.747 €	4.398 €	20.016 €	99.876.346 €	99.733.844 €	142.502 €	52.254 €	127.433 €	78.489 €	100.023.795 €	289.951 €
PORCIENTO16	0,082%	0,038%	0,069%	0,124%	0,154%	0,071%	0,236%	0,024%	0,039%	0,038%	5,519%	6,096%	0,082%	0,110%	0,140%	0,084%	5,118%	0,091%
2017	26.571 €	32.594 €	18.957 €	22.375 €	24.121 €	7.788 €	60.908 €	1.140 €	3.901 €	18.757 €	104.483.629 €	104.314.316 €	169.313 €	68.816 €	137.432 €	58.331 €	104.639.818 €	325.502 €
PORCIENTO17	0,075%	0,066%	0,066%	0,090%	0,267%	0,091%	0,322%	0,031%	0,032%	0,034%	5,471%	6,068%	0,089%	0,132%	0,144%	0,059%	5,076%	0,095%
2018	29.168 €	25.920 €	82.129 €	18.459 €	12.439 €	6.438 €	58.903 €	0.940 €	3.448 €	13.441 €	107.179.662 €	106.963.106 €	216.556 €	60.880 €	103.728 €	35.001 €	107.296.831 €	333.725 €
PORCIENTO18	0,080%	0,045%	0,286%	0,068%	0,140%	0,077%	0,253%	0,025%	0,028%	0,027%	5,338%	5,938%	0,105%	0,109%	0,105%	0,038%	4,975%	0,094%
2019	21.461 €	4.765 €	21.744 €	13.242 €	13.889 €	15.138 €	141.379 €	11.007 €	3.570 €	36.781 €	112.870.885 €	112.760.007 €	110.878 €	49.665 €	207.069 €	58.867 €	113.114.735 €	354.728 €
PORCIENTO19	0,060%	0,009%	0,071%	0,049%	0,151%	0,155%	0,648%	0,287%	0,031%	0,065%	5,404%	6,004%	0,053%	0,079%	0,214%	0,060%	5,044%	0,097%
2020	20.543 €	23.340 €	14.361 €	12.046 €	9.611 €	14.480 €	135.133 €	5.285 €	3.457 €	17.832 €	115.744.338 €	115.616.250 €	128.088 €	57.798 €	192.646 €	42.512 €	115.954.816 €	338.566 €
PORCIENTO20	0,058%	0,062%	0,055%	0,048%	0,138%	0,160%	0,639%	0,155%	0,026%	0,035%	6,109%	6,755%	0,070%	0,099%	0,224%	0,051%	5,707%	0,106%
TOTAL																		0,000 €

### *Appendix 6. Value Added - based Indicators for future research.*

The subsequent indicators were computed employing matrix calculations, leveraging (1) the Matrix  $A$  of technical coefficients, represented as an  $n * n$  matrix, where each technical coefficient can be expressed as  $a_{ij}$ . Economically, it signifies that  $a_{ij}$  units of element  $i$  are required to produce one unit of element  $j$ . Additionally, (2) an Identity Matrix was utilized to determine the Leontief Inverse Matrix  $(I - A)^{-1}$ , which holds economic significance as a multiplier informing how much production must increase to meet a specific rise in final demand. The primary purpose is to analyze the interdependence of industries within the economy, elucidating how the outputs of one industry serve as the inputs for another, establishing a profound interrelation. Furthermore, (3) diagonalization of the values in vector  $V_c$  and (4) vector EXGR was executed to facilitate matrix-based calculations following the equations stipulated in the respective indicators:

EXGR\_DVA (Domestic Value Added in Gross Exports): This indicator, expressed in millions of EUR, quantifies the domestic value added embedded in the gross exports of a specific industry ( $i$ ) in a given country ( $c$ ) to a particular partner country ( $p$ ). It essentially represents the value added generated within the domestic economy that is subsequently exported. It reveals how much of the total value of an export product includes value added produced within the exporting country, as opposed to value added originating from other countries. It provides insights into the extent to which a country relies on domestic value added in its exports and is essential for understanding the domestic economic impact of international trade. The calculation involves the use of the following formula (13).

$$EXGR\_DVA_{c,i,p} = V_c * B_{c,c} * EXGR_{c,i,p} \quad (13)$$

Where:

$V_c$  - denotes a vector containing the value added for all industries in country  $c$

$B_{c,c}$  - is the Leontief Inverse Matrix, which describes the interdependencies between industries in country  $c$ .

$EXGR_{c,i,p}$  - stands for the gross exports of industry  $i$  in country  $c$  to partner country  $p$ .

The Leontief Inverse Matrix  $B_{cc}$  plays a crucial role in the calculation. It characterizes how changes in the production of one industry affect other industries within the same country. Specifically,  $B_{c,c}$  reveals the multipliers that indicate how much the production of each industry in country  $c$  must increase to meet a unit increase in the final demand for each industry, considering the entire economy's interdependencies. This matrix provides a comprehensive view of how industries are interconnected within a country's economy, highlighting the ripple effects of economic changes.

**EXGR\_DVASH (Domestic Value-Added Share of Gross Exports):** This indicator measures the proportion of domestic value added in the gross exports of a specific industry within a country, expressed as a percentage (formula 14). It is a valuable metric for assessing the extent to which domestic value contributes to a country's exports, offering insights into the reliance on domestically generated value within international trade.

$$EXGR\_DVASH_{c,i} = \frac{\sum_p EXGR\_DVA_{c,i,p}}{\sum_p EXGR_{c,i,p}} * 100 \quad (14)$$

Where:

$\sum_p EXGR\_DVA_{c,i,p}$  - denotes the sum of domestic value added for industry  $i$  in country  $c$  across all partner countries.

$\sum_p EXGR_{c,i,p}$  - is the sum of gross exports of industry  $i$  in country  $c$  across all partner countries.

EXGR\_DVASH provides a percentage value that indicates the proportion of value added generated within the domestic economy compared to the total gross exports of the industry. A higher EXGR\_DVASH percentage suggests a greater reliance on domestic value added in a specific industry's exports, while a lower percentage indicates a higher share of foreign value added in the exported products. This metric helps policymakers and analysts understand the economic impact of international trade on domestic industries and the degree to which they contribute to a country's export performance.