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Tomasz M. Napiórkowski Mariusz-Jan Radło Jürgen Wandel

PROCESS OF MOVING UP THE GLOBAL VALUE CHAINS

A CASE OF POLISH-GERMAN ECONOMIC COOPETITION

SGH Publishing House

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Introduction

Tomasz M. Napiórkowski, Mariusz-Jan Radło, Jürgen Wandel

This book presents the results of a research project aimed at answering the research question of how the Polish economy and its enterprises can advance within the global value chains. The answer to this question is to be given in the context of Polish-German economic relations, which are characterised by strong endogenous value chain links. The relationships within the studied global value chains can be characterised as competition as well as cooperation and at times as a simultaneous combination of the two, i.e. coopetition.

There are three main reasons for taking up this topic. First, participation in the global value chains has been, is and – at least in the near future – will be of great importance for Polish enterprises and consequently for the Polish economy. This dependence, which ought to be seen in a positive context, is a result of the initial export-oriented economy development model adopted by Poland. This model makes use of Foreign Direct Investments as a source of technology transfers to domestic companies. Such transfers are used as inputs into the process of strengthening the potential of domestic companies for foreign expansion further strengthening the position of Polish firms in the global value chains. The second reason for this study is the advancement of enterprises in the global value chains, which is neither easy nor obvious. The countries that underwent such a process used various strategies to support this progress. These strategies include, but are surely not limited to subsidising innovation, periodic protection of the internal market, selective policy towards foreign investors and other industrial and commercial policy activities. As a member of the European Union, Poland can use only a few of a wide variety of instruments of such a policy, which results from the institutional conditions of the European Union internal market. The third reason for undertaking this research topic is the key importance of the Polish-German economic cooperation for the inclusion of the Polish economy in the global value chains. German companies are among the largest foreign investors in Poland, and the Polish-German trade, including that carried out within said value chains, is responsible for a large part of Polish foreign trade. The Polish-German cooperation in the discussed area includes not only cooperation, but also competition. Therefore, the Polish-German economic cooperation

in the area, which is the subject of this study should be analysed from the theoretical perspective of the phenomenon of coopetition, which is already quite widely described in both the academic and business literature. It is also worth paying attention to the recent Polish-German-French political initiatives in relation to some instruments of industrial policy, including state aid and concentration control.

This study consists of two parts divided into eight chapters. Part one is entitled "Theoretical Aspects of Global Value Chains" and consists of three texts undertaking the topic of advancement in the global value chains. This part begins with Chapter 1 "Development of Global Value Chains as a Case of Growing Economic Coopetition. A Literature Review" which examines the concept of global value chains and identifies the mechanisms of cooperation and competition within these structures. The Second Chapter "Macro and Micro-Challenges in Moving up the Global Value Chains. The Polish Perspective" presents the main challenges facing the Polish economy in the context of moving up the value chains. Moreover, due to the subject matter of the entire study, this text focuses especially on the value chain relations between Poland and Germany. The Third Chapter entitled "Homogeneity of FDI-derived Technology Transfer Barriers across Transfer Channels. A Case Study Analysis" undertakes the analysis of technology transfer channels from foreign to domestic enterprises in the context of the advancement of the latter in the global value chains. In the second part of this book, "Empirical Analysis of the Polish-German Case Study", the authors present the results of empirical research on Polish-German economic coopetition and the question of how the Polish economy and enterprises can move up within the global value chains. This part begins with the Fourth Chapter entitled "Poland's Position in the Global Value Chains", in which the author indicates that in recent years the role of Poland as a supplier and subcontractor for foreign enterprises has grown much more than as a recipient of value added used to manufacture products for export. The Fifth Chapter deals with the "German-Polish Trade Relations from the Perspective of Trade in Value Added with Specific Focus on Trade in Digital Technologies". Its author points out that trade in digital products is characterised by asymmetric growth in terms of added value and quantity, with a reference to imports, and the trade in the area of digital technologies is marginal in general Polish-German relations. Chapter Six entitled "The German FDI in Poland and the Polish FDI in Germany. Comparative Analysis" contains an analysis of German direct investments in Poland and vice versa. In Chapter Seven, "Challenges in Sustaining Germany's Export-oriented Economic Model", the model of the development of the German economy and its weaknesses resulting in the weakening position of Germany in the global value chains. were subjected to a critical analysis. The last, Eighth Chapter studies "German's and Poland's Positions on the New EU Industrial Policy. Common and Conflicting Interests" and is devoted to the Polish-German cooperation within the European Union in the area of industrial policy, as well as the similarities and differences that can be observed in this policy.

This study was conducted under the auspices of the World Economy Research Institute of the Warsaw School of Economics (project title: "Process of moving up global value chains. Case of Polish-German economic coopetition"; project number: KGS/S19/03/2019). The authors are members of the Global Economic Interdependence Department, the German Economy Research Department and the Department of European Integration and Legal Studies based in Poland at the Warsaw School of Economics.

PART ONE

Theoretical Aspects of Global Value Chains

The aim of Part One of this book is to give a theoretical background, which we believe will provide a solid base for the investigation of advancement in the global value chains. presented later in this book and also in other, future studies on this and related topics.

This part consists of three texts:

1. "Development of Global Value Chains as a Case of Growing Economic Coopetition. A Literature Review" by Marzenna Anna Weresa,
2. "Macro and Micro-Challenges in Moving up the Global Value Chains. The Polish Perspective" by Mariusz-Jan Radło,
3. "Homogeneity of FDI-derived Technology Transfer Barriers across Transfer Channels. A Case Study Analysis" by Tomasz M. Napiórkowski.

1 Development of the Global Value Chains as a Case of Growing Economic Coopetition. A Literature Review

Marzenna Anna Weresa

Introduction

Rapid changes in today's world economy related to the liberalisation of trade and foreign direct investment (FDI) flows, further supported by advances in information and communication technology dynamised cross-border cooperation and re-shaped global production and distribution networks. In the era of globalisation, companies worldwide are challenged with the decision whether and how their value chains should be broken across borders and what should be the extent of control over the different parts of their production processes in order to successfully face competitive pressure. There are numerous activities performed by companies along value chains, such as research and development (R&D), design, production, marketing, distribution (Porter, 1986). The decisions about spreading various activities into different locations lead to the development of the global value chains. (GVCs). As a result new trade flows have been created, new international activities have been undertaken, FDI flows have increased, and international production has expanded. GVCs, on the one hand, have expanded the reach of globalisation, and on the other, have changed structures of domestic industries.

The aim of this paper is to explore the GVC concept and identify mechanisms of cooperation and competition within GVCs.

The paper is organised as follows. The next section discusses the concept of the global value chains and its foundation in the economic literature. It is followed by the analysis of

coopetition (simultaneous competition and cooperation between rivals) that can emerge within global production networks. The last section provides a short summary of main findings from a literature review.

The concept of Global Value Chains (GVCs)

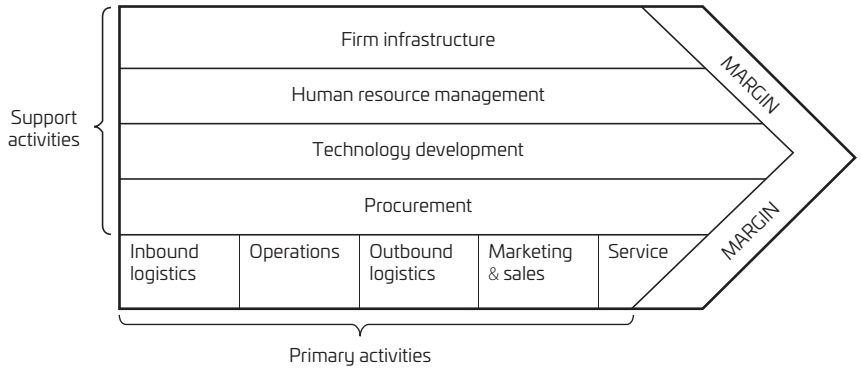
The definition of global value chains is grounded in the value chain concept, which looks at systems and mechanisms describing how inputs are transformed into final outputs purchased by consumers (Porter, 1985). The value chain means all the activities undertaken by companies to market a product, from the very idea to the end use. They include design, production, marketing, logistics and distribution, as well as after-sales services. According to Michael Porter there are two categories of business processes included in the value chain:

- Primary activities
- Support activities

Primary activities consist of five elements and they all add value necessary to achieve a competitive advantage. These elements are as follows: inbound logistics, operations, outbound logistics, marketing and sales (Figure 1).

The support activities constitute a second group and they are necessary to increase the efficiency of primary activities. The following are included in Porter's value chain model as support activities: infrastructure, procurement, human resources, research and development (Figure 1).

Figure 1. Elements of value chain according to Michael Porter



Source: Porter, 1985, p. 37.

These activities can be performed by one company or shared among many companies located in different countries (Backer, Miroudot, 2013, p. 7). Gradually, companies have combined outsourcing and offshoring for various functions along their value chains. Outsourcing allows to benefit from the economies of scale and scope.

Global value chains can be cost-driven as organising supply along the value chain from low-cost producers can bring significant cost cuts. GVCs can be also market-driven when multinationals move a part of their value chain to emerging countries in order to use the potential of their market growth.

Why do multinationals disperse value chains globally

Foreign direct investment (FDI) is one of the ways used by multinationals to disperse value chains globally. FDI is not only a transfer of capital, but also transfer of technology. This transfer can take a physical form, i.e. machines and equipment, as well as non-physical, i.e. licenses and know-how. Qualifications, marketing methods and organisation management can also be transferred through FDI, which enables the whole organisation to learn using inter- company collaboration networks (Wilkins, 1998).

The following characteristics of multinationals are distinguished in the literature: focus on global efficiency, sovereignty, geographical dispersion, flexibility, complexity, the ability to integrate, networking, specialisation and growing knowledge intensity (Zorska, 2007). These features are strongly related to the motivation to disperse value chains globally.

Sovereignty is defined in a few different ways. On the one hand, this means that MNCs make decisions about their activities partly irrespective of the interests of the countries where the business is based. On the other hand, this applies more to the authorities of host countries. As MNCs have an impact on the economic structure of host countries, there may be restrictions on this sovereignty imposed by the state authorities (e.g. restrictions regarding foreign ownership). In today's world, MNCs may also limit their sovereignty through alliances or contracts if it a precondition for achieving higher profits or a larger market share, etc.

The geographical dispersion of the value chains seems to be increasingly important for modern MNCs. In order to reduce costs, they still need to look for locations offering better conditions for the development of specific parts of the value chain that allow to increase productivity (Criscuolo, Timmis, 2018). The development of communication and transport technologies facilitates this process. Thanks to modern communication techniques, including the Internet, the geographical distance is less important. However, geographical location does still matter.

Configuring GVCs aims to improve the global effectiveness of MNCs, which is reflected in the company's overall financial performance. The efficiency of an MNC is measured for

the entire organisation, not for individual organisational units. An increased efficiency of MNCs can be achieved through cost reduction, innovation, flexibility, smart management of organisational complexity or ability to integrate. Thanks to the development of information technologies, new opportunities have emerged to increase global efficiency, such as improvements in communication and coordination, usage of new organisation and management methods, outsourcing or use of electronic commerce (B2B, B2C platforms).

The flexibility of MNCs means an ability to quickly and efficiently adapt to changes and to smartly adapt processes inside and outside MNCs. This may apply to strategic and operational decisions. The higher the flexibility, the faster MNCs can adapt to the needs and opportunities on the foreign market, as well as to overcoming crises arising from the operation of the organisation.

Complexity can be understood as a number of key and interacting elements in the system (value chain, organisation structure, etc.) or in a specific area (ownership, competitiveness, strategy, configuration). Growing complexity is becoming more and more important within value chains that are increasingly technologically advanced, specialised, and decomposed. Mergers and acquisitions also deepen the ownership and organisational complexity of MNCs.

The ability to integrate is a feature of contemporary MNCs that defines cross-border corporate strategies and structures. It is about the integration of geographically dispersed, functionally specialised and locally adapted activities. The ability to integrate has gained importance in recent years, as models of creating added value in MNCs are evolving. Currently, these enterprises focus on core activities, moving other activities to specialised companies. The success of such a model depends on the smart integration of the results of work performed in many different locations within the global value chain. MNCs can also integrate the capabilities of other entities. In addition to transforming value creation chains, organisational structures are evolving, becoming more horizontal, decentralised and networked. The importance of information and communication systems is also growing (OECD, 2019).

The dispersion of value chains facilitates the process of benefiting from cultural, economic, administrative and geographical differences between different regions of the world. This applies to macroeconomic differences as well as to differences between sectors or industries.

Networking is the main attribute of the functioning of modern MNCs. Today, multinational enterprises are moving away from a bureaucratic and hierarchical structures because they are less effective in a rapidly changing environment. Modern MNCs consist of many different business units that through cooperation contribute to increasing flexibility of the whole organisation. This flexibility is necessary for innovation and competitiveness as it may impact the efficiency of the entire organisation. The networking includes not only organisational units of one multinational enterprise, but also may include suppliers, clients and even competitors. In the global competitive environment, cooperation in the form of

strategic alliances, joint ventures, etc. brings beneficial effects to all participants, reduces uncertainty, expands access to resources or creates the possibility of achieving some common goals. Simultaneous competition and cooperation between global competitors is more and more popular and it is described by the term "coopetition" (Luo, 2007).

Specialisation is another important feature of MNCs that motivates them to disperse value chains across borders. MNCs focus on key activities moving other activities to subcontractors, which may be their own units or independent suppliers. Increasing functional specialisation requires more specialised supplies, including specialised services. In addition, specialisation is related to specific locations, which can be seen by the growing interest of MNCs in locating information technology activities or biotechnology activities in regional or urban industry clusters (OECD, 2019).

Knowledge plays a significant role in configuring the global value chains. It has become a key economic resource, more important than capital, natural resources or labour. Enterprises create competitive advantages by deriving knowledge from other sources and integrating it (Christensen et al., 2004; 2010). Knowledge is also a key determinant of resource allocation among different locations. There are strong linkages between knowledge generated in MNCs and knowledge from outside.

Figure 2. Determinants for relocating R&D activities abroad

Type of R&D unit	Attractive local characteristics	
	of the supply of scientific and technological expertise	of demand
Local development centre	Quality of training (engineers, technicians) Local technological infrastructure	Large local market (size, purchasing power)
Global research laboratory	Centres of excellence Links between research and industry	Market leader
Globall development centre	Cost benefits of labour for R&D activities IPR protection	–

Source: Own elaboration based on Sachwald, 2013, p. 20.

As a strategic resource, knowledge must be managed in a special way. The method of knowledge transfer, due to its intangible nature, is determined more by the possibilities of further knowledge development, acquisition and integration with foreign sources than transaction costs. Therefore, access to knowledge is regarded as one of the determinants of the global value chains. development. R&D activities have become more geographically and functionally diversified nowadays. Openness and internationalisation of innovation processes lead to the creation of global open innovation networks. There are many interactions between the development of GVCs and the geographical scope of R&D activities. F. Sachwald (2013) proposed an interesting classifications of drivers of internationalisation

of R&D and growing attractiveness of open innovation for MNCs. It shows main motivations for the relocation of R&D abroad along the GVCs (Figure 2).

In practice, technology and engineering of the production process defines how the different stages of production are linked and configured in the GVC. All types of technologies used in the enterprise are important for gaining and achieving a competitive advantage. Innovations that arise within these technologies contribute to the competitiveness of enterprises. Figure 3 offers an overview of technologies that can be seen in different parts of value chains.

Figure 3. Technologies in the enterprise value chain

Firm infrastructure	Information systems technology Planning and budgeting technology Office technologies				
Human resource management	Training technology Motivation research technology Information systems technology				
Technology development	Product technology Computer assisted design Pilot production technology		Software development tools Information systems technology		
Procurement	Information systems technology Communication systems technology Transportation systems technology				
	Transport technology Technology for unloading raw materials Storage and maintenance technology Technology of communication systems Testing technology Information systems technology	Basic process technology Raw material technology Machine technology Technology for reloading raw materials Packaging technology Maintenance methods Testing technology Building design and operating technology Information systems technology	Transport technology Raw material loading technology Packaging technology Technology of communication systems Information systems technology	Media Technology Audio and video recording technology Technology of communication systems Information systems technology	Technology for testing and diagnostics Technology of communication systems Information systems technology
	Inbound logistics	**Operations**	**Outbound logistics**	**Marketing and sales**	**Service**

Source: Porter, 2006.

Nowadays, in the global economy which is characterised by a rapid development of information and communication technologies, gaining competitive advantage by companies is largely dependent on the ability to use information technologies and those related

to the process of distance communication. They permeate most activities throughout the entire value chain, with information playing a huge role in it (Porter, 2006, p. 215).

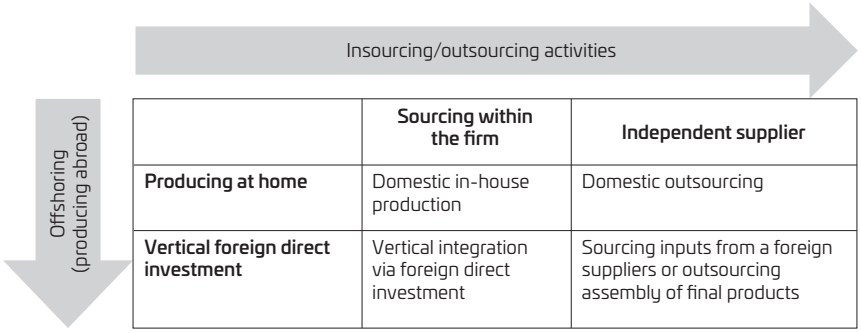
The literature distinguishes two types of global value chains: spiders and snakes. The spider configuration is based on linking many parts to form an assembly. The snake is configured as a sequence from upstream to downstream. In practice most production processes are a combination of these two types of GVCs (Baldwin, Venables, 2012, p. 2). The structure of GVCs has an impact on the catch up of firms through productivity gains.

Foreign affiliates facilitate access to international markets to domestic enterprises as they connect the domestic value chain with the global value chains. Efficiency depends on both the domestic and foreign parts of the value chain. Both cooperation and competition are important in this process of linking global players with domestic firms. As a result of GVCs expansion, local companies can also become global firms and expand internationally (Criscuolo, Timmis, 2018).

Coopetition and GVCs development

The rise of GVCs poses new challenges to international trade and competitiveness. In particular, to remain competitive, companies have to use a variety of input sources and develop many different channels for collaboration. However, the propensity to cooperate with foreign partners varies substantially across countries (Cataneo et al., 2013).

Figure 4. GVCs and new sourcing strategies



	Sourcing within the firm	Independent supplier
Producing at home	Domestic in-house production	Domestic outsourcing
Vertical foreign direct investment	Vertical integration via foreign direct investment	Sourcing inputs from a foreign suppliers or outsourcing assembly of final products

Source: Cattaneo, et al., 2013, p. 3.

Figure 4 shows possible production structure combinations seen from the organisational and geographical points of view. Activities can take place only inside the company or in one country. Thus, it is domestic internal production. Another possibility is to keep some production stages inside the company, and move others to a foreign location, i.e. offshore

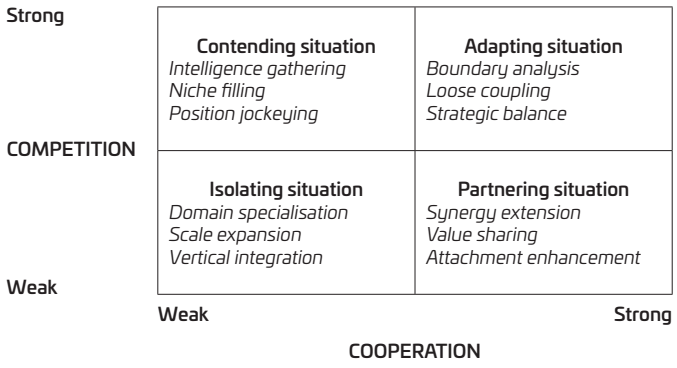
production through vertical foreign direct investment. Companies can also outsource activities to independent contractors or suppliers with which they maintain commercial relations in the country (domestic outsourcing) or abroad (offshore outsourcing). These new acquisition strategies lead to increased cooperation with various domestic and foreign entities and also stimulate intra-company trade as well as vertical trade with independent suppliers.

These new sourcing strategies change cooperation patterns, which tend to be complex and multi-country (Cataneo et al., 2013). On the one hand, collaborative efforts have increased, but competitive pressure has also grown. Collaboration and competition are in play, even among competitors. This simultaneous competition and cooperation between rivals competing in global markets is called coopetition in the literature (Gnyawali, Madhavan, 2001; Luo, 2007). There are at least four diverse patterns of coopetition. They depend on the combinations between the intensity of cooperation and competition. These options are: rivalry, adaptation, isolation and partnering (Luo, 2007). Figure 5 illustrates these different options.

Under a contending situation, multinationals focus on intelligence gathering as knowledge is a key factor for competing. Another strategic tactic to face strong competition is niche filling, which is aimed at identifying a market niche and penetrating it. The third response to rivals' competitive pressure is position jockeying meaning a defense of the already held position.

A strong competition and strong willingness to cooperate with rivals may lead to adapting situations with three basic tactics: boundary analysis, loose coupling or looking for strategic balance (Figure 5).

Figure 5. Diversity of coopetition within GVCs



Source: Adapted from Luo, 2007, p. 136.

A combination of weak cooperation and weak competition pressure is the easiest situation for multinationals. In such an isolating situation, they may chose focusing on domain specialisation, scale expansion or vertical integration.

The situation most encouraging to coopetition occurs when rivals are forced to intensify competition and simultaneously develop cooperation. It is a partnering situation with three basic tactics used by MNCs: synergy extension, value sharing and attachment enhancement.

The research on these coopetition options confirms that there is no one ideal way to combine collaboration and competition. It varies across countries and sectors (OECD, 2019).

Summary

Nowadays, under globalisation in the world economy, companies are challenged with the decision whether and how their value chains should be broken across borders. In order to face successfully competitive pressure, companies should decide about the extent of control over different parts of their production processes. These decisions about spreading various activities into different geographical locations lead to the development of global value chains. The development of GVCs has changed the pattern of cooperation and competition. In many cases multinationals have to simultaneously collaborate and compete. Such a coopetition has many facets. Four main situations of coopetition have been distinguished in the literature: a contending situation, adaptation, isolation and partnering. The choice of any of these options depends on the strength of cooperation and competition required by multinationals in their global activity. The pattern of coopetition varies across sectors and countries.

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2 Macro and Micro- Challenges in Moving up the Global Value Chains. The Polish Perspective

Mariusz-Jan Radło

Introduction

In recent years, the desire to include the economies of entire countries or their regions in the global value chains. GVCs have become a very important element of economic growth policy planning as well as economic research conducted for such a policy. Depending on the field, global value chains are also called "global factory" (see Buckley, 2009), "global production network" (see Henderson et al., 2002) or the "global commodity chain" (see Gereffi, 1999). As indicated by Radło (2013, 2016), Taglioni and Winkler (2016) or UNCTAD (2013), this approach has become typical of countries at various levels of development and it is very important for the development policies implemented at the national, regional and local levels.

These processes are associated with the development of local, regional and global production chains and growing fragmentation of production processes for goods and services. Growing global production fragmentation results in increasing flows of foreign direct investment, as well as the growing trade flows. In recent decades the increase in these flows has significantly exceeded the dynamics of changes in the world GDP and value added. The inclusion of economies and enterprises in the value chains means that they can benefit from trade, as well as participate in the flow of factors of production, including those more unique, such as knowledge and technologies. In addition to incorporating into the global value chains, economies and enterprises can benefit from the development of local and

regional production chains, the development of which leads to the increase in diversity of enterprises in the economies of countries and regions. And this can stimulate the development of cluster structures with a positive impact on innovation. In addition to incorporating economies and enterprises into value chains, moving up these chains is a major challenge. It includes an ability to perform in more complex and advanced business processes related to the production of various intermediate or final goods and services and an ability to influence and control the shape of the value chains in which they participate.

As indicated by Buckley (2009) or Gereffi et al. (2005), the attractiveness of this approach lies also in the fact that understanding the operation of various industries can provide deep insight into the development opportunities of companies, clusters, regions and countries. Understanding the value chains in which enterprises operate in a specific industry in a region or a country and in the world is therefore necessary to implement the strategy of enterprises as well as governments pursuing national or regional economic policies. It also gives the opportunity to determine not only the paths of corporate development, but also helps policy makers accelerate economic development in less developed areas or stimulate structural changes aimed at promoting participation of enterprises in value chains or moving them up in these chains. This, as mentioned before, may be associated with the development of the ability to perform in more advanced processes with a higher value added, and consequently to generate higher profits, higher wages and a higher contribution to regional and national income.

From this perspective, the aim of this chapter is to shed some light on the main challenges facing the Polish economy in the context of moving up value chains. Moreover, due to the subject of the entire study, special attention will be paid to relations in value chains between Poland and Germany. The Second Chapter presents the main challenges facing the Polish economy in the context of moving up the value chain. Moreover, due to the subject matter of the entire study, a particular attention is paid to the relations in value chains between Poland and Germany.

Variety of macro and micro- challenges in GVC oriented policies

The tendency to develop development policies based on value chains described above intensified in the first decade of the 21st century and accelerated in the second decade. As a result, there were many scientific studies carried out by individual researchers as well as publications sponsored by economic development-oriented international organisations including OECD, UNCTAD or the World Bank. This resulted in an increase in the number of studies on how to shape economic policies to take advantage of GVCs and overcome emerging challenges.

Table 1. Areas and activities of value chain-oriented development policy

Author	Area	Challenge	Description
UNCTAD (2013)	Choice of an effective GVC oriented strategy	The challenge of choice between moving up the existing value chains or developing own value chains	Countries may choose between the GVC-oriented industrial policy and industrial development strategy that builds national production capacity at all stages of production to develop a vertically integrated industry that remains relatively independent in its relation to key actors in the global value chains, including independent learning and improving goods and services.
Lin et al. (2017)	Firm strategies and related industrial policies		"In-out-in-again" hypothesis – from the point of view of latecomers and the economies of catching up countries, participation in the global value chains. allows for the transfer of knowledge and acquisition of skills. However, sometimes in order to move up value chains, companies should leave the production chain controlled by global players to build their own potential and their own value chain – and only then re-join GVCs as a stronger player.
UNCTAD (2013)	Various areas of development policy: ▪ Embedding GVCs in the development strategy ▪ Enabling participation in the global value chains. ▪ Building a domestic production capacity ▪ Ensuring a strong environmental, social and governance framework ▪ Synergisation of commercial and investment policies and institutions	The challenge of implementing a multi-level industrial development policy	Integrating the global value chains. into industrial development policies, setting policy goals along with GVC development pathways. Creating and maintaining favourable conditions for trade and investment. Introduction of infrastructural conditions for participation in GVCs. Supporting the development of enterprises and increasing the bargaining power of local companies Strengthening workforce skills. Minimising the risk associated with GVC participation through public and private regulations and standards Supporting local enterprises in complying with international standards. Ensuring consistency between trade and investment policy Synergisation of promotions and facilitations in trade and investments Creating 'regional factors for industrial development'.
Gorynia (1996)	Industrial policy		There are various factors limiting effectiveness of industrial policy including among others imperfect information available to economic policy makers, technical limitations causing the lack of information flow on the best solutions that prevent rational decisions, excessive dependence on the influence of interest groups that can enforce decisions favourable for them and the last but not least limited willingness of business entities to share information of fundamental importance until it is too late to intervene.
Gereffi I Sturgeon (2013)	GVC-oriented industrial policy	The challenge of adapting GVC-oriented industrial policies to roles played by firms in these chains	Adaptation of industrial policy to the structures of value chains and business models of industries. Exploiting the opportunities offered by global sourcing and specialisation within the value chain. Striving to move towards the top of the value chain in terms of sophistication and value added.

cont. table 1

Author	Area	Challenge	Description
Miroudot et al. (2013);	Commercial policy	The challenge of adapting commercial policy to the needs of GVC	Influencing the shape of value chains by customs in such a way as to make the location of activities within existing or desired value chains more attractive.
Taglioni, Winkler (2016).	Inclusion in value chains.	The challenge of combining GVC-oriented policy with the national economy development path	Attracting foreign investors and stimulating the participation of domestic enterprises in value chains.
	Expansion and strenghtening of share in value chains		Promoting economic modernisation and compaction Strengthening the absorption capacity of domestic companies.
	Shifting value chain participation in sustainable development		Promoting the growth of society's well-being, through increase in wages, health and safety, social cohesion, environmental protection, etc.
Brennan and Rakhmatullin (2015)	GVC and intelligent specialisations	The challenge of combining GVC-oriented policy with smart specialisation policies	The innovation policy should combine an approach based on smart specialisations with an approach based on a deeper understanding of global value chains. The smart specialisation policy should be based on continuous commitment, anticipating industry evolution, assessing challenges and opportunities, and responding proactively to these challenges and opportunities. Understanding GVC can be based on the M3DA model. Combining both approaches increases the success of strategies based on smart specialisations.
Radosevic and Ciampi Stancova (2018)	GVC and inteligent specialisations		The innovation policy should combine an approach based on smart specialisations with an approach based on a deeper understanding of global value chains.
Giuliani et al. (2005)	GVC industrial clusters	The challenge of combining GVC-oriented industrial policy with cluster policy	The development of industrial clusters can stimulate the improvement of the position of domestic enterprises in the global value chains. Thus, these authors pointed to the importance of companies' participation in the global value chains. and that, thanks to this, they can strengthen their competitiveness and strengthen their competitive position in such chains. They also pointed out that the development of industrial clusters, which could further strengthen the position of enterprises in value chains, is important.
Zawalińska and Rok (2017) Brennan and Rakhmatullin (2015)	Measuring and mapping value chains	The challenge of measuring and mapping GVC	Preparing estimates of regional input-output tables (based on survey, non-survey and hybrid methods). Using qualitative research with the participation of entrepreneurs to map the industrial value chain – including the M3DA method.
Ayiar et al., 2013) Stehrer and Stöllinger (2015)	Shape of central European value chains	The challenge of understanding Poland's current participation in GVCs	Not described.

Source: UNCTAD (2013).

These studies cover many types of challenges associated with the participation in GVCs as well as provide specific guidance on how to face them. The challenges are related to the

choice between moving up the existing value chains or developing own value chains (UNCTAD, 2013; Lin et al., 2017), implementing a multi-level industrial development policy (UNCTAD, 2013; Gorynia, 1996), combining the GVC-oriented policy with a national economy development path (Taglioni, Winkler, 2016), combining the GVC-oriented policy with smart specialisation policies (Brennan and Rakhmatullin, 2015; Radosevic and Ciampi Stancova, 2018), adapting the GVC-oriented industrial policies to the roles played by firms in these chains (Gereffi I Sturgeon, 2013), adapting a commercial policy to the needs of GVCs (Miroudot et al., 2013), measuring and mapping GVCs (Zawalińska and Rok, 2017; Brennan and Rakhmatullin, 2015), understanding Poland's current participation in GVCs (Ayiar et al., 2013; Stehrer and Stöllinger, 2015). All these challenges are described in Table 1 and commented in the subsequent subchapters.

The challenge of choice between moving up the existing value chains or developing own value chains

The first challenge to mention is the need to select the most effective industrial policy strategy focused on value chains, and making a choice between moving up the existing value chains or developing own value chains. Unfortunately, the empirical literature on this issue does not provide a final solution to the problem of the most effective strategy.

As indicated by UNCTAD (2013), active promotions of global value chains and economic development strategies based on these chains mean encouraging and supporting business activities aimed at generating exports in fragmented and geographically dispersed industry value chains, based on a narrower set of production factors and competitive advantages. This approach implies the use of active policies that encourage learning based on value chain activities in which the country and its enterprises are present. The purpose of this process is to reorient the economy to carry out activities with higher added value as part of the existing value chains and to diversify it by entering new chains with higher added value. However, the above strategy is not non-alternative.

It is also possible to apply an industrial development strategy that builds national production capacity at all stages of production to develop a vertically integrated industry that remains relatively independent in its relation to key actors in the global value chains, including independent learning and improving products and services. The decision on whether and to what extent to include them in the development policy the possibilities offered by the policy based on the global value chains is therefore a strategic choice which should be based on the assessment of costs and benefits of proactive policies promoting GVC or development strategies led by GVC. This decision should be based on the analysis of the specific situation of each economy or industry, including the level of development or equipment

in production factors. It should be noted that promoting participation in the global value chains is inherently selective being only one aspect of the country's overall development strategy. Of course, the nature of such a policy is also determined by the size of the economy, because in smaller economies with limited equipment (including limited diversity) with various factors of production, there is a small alternative to development strategies that take into account a certain degree of participation in the global value chains. So, the key question is not so much whether to participate in the global value chains, but how to do it.

A very important challenge of inability to move up the value chain because of the position of current global players is an issue that may influence the above choice. This challenge has become the reason for the "in-out-in-again" hypothesis proposed by Lin et al. (2017). Based on the analysis of the experience of China, Korea and Brazil, these authors pointed out that from the point of view of latecomers and the economies of catching up countries, participation in the global value chains allows for the transfer of knowledge and acquisition of skills in various areas of the production of goods and services. Sometimes, however, companies may not be able to advance in the value chain because it is effectively blocked by global players controlling these chains. Therefore, the aforementioned authors indicate that, in order to move up the value chains, companies should leave the production chain controlled by global players to build their own potential and their own value chain – and only then re-join GVC as a stronger player.

The challenge of implementing a multi-level industrial development policy

Another challenge refers to the nature of GVC-oriented policy and the need to implement a multi-level policy based on a deep understanding of GVC, its own economy, enterprises, and the need to achieve synergies between different policy areas and institutions. This challenge also includes the risk of inefficiency of selective and active GVC-oriented industrial policy.

The implementation of multi-level and synergistic development policies is based on a thorough knowledge of GVC as well as possibilities and needs of enterprises. In addition, UNCTAD (2013) points to five areas of development policy and different types of actions that can be implemented to benefit from the participation in the global value chains. The first area of activity relates to embedding GVC in the national development strategy. In this respect, the key is to strive to integrate the global value chains into industrial development policies and to set policy goals that take into account GVC development paths, and thus in practice to thoroughly explore these chains and the country's capabilities. The second area of activity is to enable participation in the global value chains. In this respect, the

importance of creating and maintaining favourable conditions for trade and investment and the creation of infrastructural conditions conducive to participation in the value chains is to be emphasised. The third area of activity concerns building a domestic production capacity. This includes supporting business development and increasing the bargaining power of local companies, as well as strengthening the skills of the workforce. The fourth area of activity includes providing a strong environmental, social and management framework for the development of GVC. In this respect, minimising the risk associated with GVC participation through regulations and public and private standards, as well as supporting local enterprises in order to comply with international standards, was considered as the key issue. The last policy area is the so-called synergy between commercial and investment policy and institutions. The aim of activities in these areas is to ensure coherence between trade and investment policy, synergisation of promotion and facilitation of trade and investment, as well as creation of regional factors of industrial development.

Moreover, a high level of complexity of GVC-oriented policies strengthens the challenges typical of a selective industrial policy. Among such challenges, Gorynia (1996) included imperfect information available to economic policy makers, technical limitations causing a lack of information flow on the best solutions that prevent rational decisions, excessive dependence on the influence of interest groups that can enforce decisions favourable to them, limited willingness of business entities to share information of fundamental importance until it is too late to intervene.

The challenge of adapting GVC-oriented industrial policies to the roles played by firms in these chains

Another challenge is related to the specificity of GVC-oriented industrial policy and the fact that enterprises can play different roles in these value chains, and relationships in these chains can be very complex.

This issue was investigated by Gereffi and Sturgeon (2013), who pointed to three key features that distinguish industrial policies focused on the global value chains. First, they indicated the importance of the role of suppliers. It is because industrial policies are increasingly based on a deep understanding of the value chain structures and industry business models. In this regard, it is particularly important to understand how the networks of suppliers and intermediaries of various processes (production of goods and services) are organised. The importance of suppliers is due to the fact that they are making many new investments that the catching-up countries are trying to get. In many cases, suppliers also generate the majority of exports. What is more, the largest suppliers serve many clients, so the success of the investment is not necessarily related to the success of one leading company. Secondly, they

highlighted the importance of global sourcing and specialisation within the value chain. They pointed out to the challenge mentioned before by UNCTAD (2003) that policies promoting links with the global value chains have completely different goals than traditional industrial policies, which are aimed at building a fully developed, vertically integrated domestic industry. Such policies can be targeted at specialised niches in the global value chains, including, for example, niches with high value added. This kind of specialisation causes dependence on the value chain, including dependence on imported goods and services, and the fact that the entire value chain may never be intercepted by these enterprises. However, this position ensures that suppliers are constantly committed to the latest technologies, standards and "industry best practices". Thirdly, industrial policies focused on the value chains are characterised by advancement in these chains in terms of sophistication and value added. In this dimension, it is evident that the location of operations in a country by global suppliers also means long-term advantages. Leading local companies can rely on global suppliers and global supply chains for a variety of goods and services: from design, to production, logistics, to marketing and distribution. And this can reduce the risk and entry barriers for local businesses. It may include access to production capabilities and business scaling to sizes much larger than those offered by the domestic market and ensure the ability to offer products and services perfectly adapted to the highest world standards.

The challenge of adapting commercial policy to the needs of GVC

Another challenge to mention in the context of the GVC-oriented industrial policy is that the global production fragmentation results in growing trade in intermediate goods and services. This means that the global value chains are influenced by trade policies and trade duties, the value of which may accumulate within the value chain. These chains are also susceptible to the impact of non-tariff barriers.

This challenge was pointed out by Mirodout et al. (2013) who indicated that, if the production chain is vertically fragmented, then trade in intermediate goods and services becomes crucial. In this situation, it is important to recognise how this chain is affected by customs protection measures imposed on various types of intermediate goods and services that make it up. This is all the more important as the duties imposed on flows along the value chain are cumulative. This means that the trade policy of individual countries may have a positive or negative impact on the location of its various components. From the above observations, it can also be concluded that countries may more or less actively stimulate the integration of their economies into value chains in various areas. In order to apply such an active trade policy, it is necessary to thoroughly recognise the structure of value chains and the business models underlying them, as indicated by UNCTAD (2013).

The challenge of combining the GVC-oriented policy with the national economy development path

Very interesting challenges related to moving up the value chains appear in the stages of economic development path and the related GVC-oriented industrial policies.

These issues were studied by Taglioni and Winkler (2016), who said that less developed countries, thanks to the integration of their domestic companies (suppliers and end producers) with the global value chains, can help modernise their economies in three steps. At the first stage, countries should focus on integrating economies and enterprises into value chains. At this stage, attracting foreign investors and stimulating the participation of domestic enterprises in value chains is crucial. The second, more advanced stage includes seeking to expand and strengthen the participation of enterprises and economies in value chains by promoting economic modernisation and reinforcement or increase in the number of enterprises participating in value chains, as well as strengthening the absorption capacity of national enterprises. The third, most advanced stage aims to transform participation in value chains into sustainable development by promoting the growth of society's well-being, by increasing wages, health and safety, social cohesion, environmental protection, etc.

The challenge of combining the GVC-oriented policy with smart specialisation policies

A very interesting challenge from the point of view of shaping industrial policy and moving up the value chains is associated with combining GVC-oriented policy with smart specialisation policies.

Brennan and Rakhmatullin (2015) presented a very interesting concept of combining these two approaches at the regional level. These authors recommended an active policy towards the development of smart specialisations focused on GVC and based on four principles including: engaging in the industry and its stakeholders, anticipating the probable evolution of the industry in the world, assessing challenges and opportunities that are likely to arise from future industry trajectories, and responding proactively to these challenges and opportunities. In their opinion, the process based on these four principles should be sustainable and based on the active participation of the main stakeholders of the process. At the same time, they emphasised that it is necessary to combine investing in smart specialisations with a focus on GVC. For this reason, they recommended an in-depth analysis of such chains in a process they called M3DA (Mapping, Digging, Determining, Decomposing and Ascertaining). This process involves the subsequent stages of examining value

chains, including: (1) value chain mapping taking into account various geographical and enterprise / organisational dimensions, (2) digging into the each stage in terms of terms of activities, resources, assets, capabilities, relationships and financial and operating data; (3) determining the chain orchestration in terms of actors, linkages and flows; (4) decomposing the activities at each stage into occupations and associated tasks; and (5) ascertaining the participation possibilities by considering not only the status quo, but by also predicting likely future development trajectories for a given value chain.

Radosevic and Ciampi Stancova (2018) are also advocates of combining the innovation policy based on the concept of smart specialisation with an approach based on a deeper understanding of GVC. In their research, they pointed out that directing less-developed countries and regions towards a path of growth based on research and development requires not only an endogenous knowledge and technology accumulation, but also links with an international knowledge and production network. Analysing the example of EU member states that joined it in 2004 and later, they pointed out that their innovation systems are fragmented and based largely on public R&D systems and direct foreign production-oriented investments. And it means that in these countries, according to these authors, a stronger support for innovation-oriented activities and integration with the global value chains and foreign direct investment in local innovation systems is necessary.

The challenge of combining the GVC-oriented industrial policy with cluster policy

Another challenge for moving up the value chains refers to combining the GVC-oriented industrial policy with a cluster policy.

In the middle of the first decade of the 21st century, Giuliani et al. (2005) pointed out that while enterprises can benefit from the development of industrial clusters to overcome their growth constraints. However, they recognised the external links of enterprises and the role of global buyers to support modernisation at a cluster level. Thus, these authors pointed to the importance of enterprise participation in the global value chains. They emphasised that thanks to this participation, they could strengthen their competitiveness and strengthen their competitive position in such chains. They also indicated that the development of industrial clusters could further strengthen the position of enterprises in value chains. They emphasised that the manner in which this chain is managed is also important for advancing the value chain. In quasi-hierarchical value chains, pressure to comply with standards imposed by leaders results in improved product and process modernisation, but functional modernisation is almost always inhibited.

The challenge of measuring and mapping GVC

A very important challenge for shaping policies oriented to moving up value chain is the fact that they must be based on evidence. However, measuring, understanding and describing the value chains is a difficult task.

One of the most popular measures describing the shape and structure of value chains at the national and international level is based on data on the structure of input-output flows, the construction of which was developed by Leontief (1937). Such tables for national economies and prepared every few years by the national statistical offices. Moreover, in recent years there were also developed international input-output tables for many countries including Poland. Nonetheless, availability of such tables to regions is very limited. What is available is only the estimates of such tables based on national input-output tables. In the case of Polish economy such tables were estimated by Zawalińska and Rok (2017), who developed voivodeship input-output tables for Poland. Earlier research in this area, as indicated by the above mentioned authors, was also conducted by Welfe et al. (2008), Godyń (2012) Chrzanowski (2013) and Torój (2016). As indicated by Lahr (1993), Boero et al. (2018) or the aforementioned Zawalińska and Rok (2017), such estimates are based on survey, non-survey and hybrid methods.

The advantage of examining value chains based on input-output flows is an in-depth analysis of industry and regional links, but for the analysis of specific industrial value chains and their actual shape, qualitative research with the participation of entrepreneurs is a better approach. This approach also dominates in the case of analyses of specific industries and value chains in which enterprises participate. One of such a method discussed above was proposed by Brennan and Rakhmatullin (2015), who called it M3DA.

The challenge of understanding Poland's current participation in GVC

In recent decades, Poland has significantly benefited from its participation in global and European value chains. Its inclusion in these chains was a consequence of the opening of the inflow of foreign investors and free trade – especially in relations with the EU. This resulted in a rapid increase in exports and the development of many sectors of the economy, including in particular those dominated by foreign investors. What is a negative side of such a development path is the overdependence on foreign investors in many sectors of the economy, which may prove to be impermanent as soon as they decide to relocate their activities outside the country. What is more, the willingness of foreign investors to relocate

to Poland all processes with the highest added value is a questionable issue. Finally, a relatively weak position of Polish enterprises in global and regional terms of value still remains a challenge for the economy.

In the above perspective, the implementation GVC-oriented policy aimed at moving up value chain remains a significant challenge for the Polish economy. Such a policy cannot take place without taking into account the specificity of Poland's participation in value chains, in particular without the understanding and improvement of concentration of European manufacturing activity in German-Central European production chain (Ayiar et al., 2013). This phenomenon was also described by Stehrer and Stöllinger (2015), who indicated that Europe's manufacturing activity is increasingly concentrated in the Central European (CE) core. This core is dominated by Germany and in addition comprises Austria and the four Visegrád countries (the Czech Republic, Slovakia, Hungary and Poland). Positive effects for Poland resulting from its participation in CEMC cannot be questioned. However, a growing risk associated with the inability to move up the value chain cannot be ignored. Therefore, the understanding of Poland's participation in this core is one of most essential issues in the evidence based the GVC-oriented policy in Poland.

Summary

Summing up the above considerations, it should be indicated that there is a great potential for the GVC-oriented industrial policies. However, this approach is not without any shortcomings and problems typical of industrial policies. The understanding of the macro and micro challenges in moving up the global value chains and the related GVC-oriented policy issues discussed in this chapter are, however, an important starting point for improving the effectiveness of such a policy. Among the advantages of GVC-oriented industrial policy is the attention paid to building lasting demand links that stimulate the development of enterprises. Without a sustained demand stream, it is impossible to develop enterprises and effective supply side industrial policies, such as smart specialisations or cluster policy. Another feature of the GVC-oriented industrial policy is its transformational role. The inclusion in value chains stimulates not only demand but also the transfer of knowledge and technology – resulting from cooperation within the value chain. Such a policy also aims to strengthen enterprises from a country or region in their efforts to move up value chain. Moreover, it is also important to know that the ultimate goal of the GVC-oriented industrial policy is to promote growth of society's well-being, through increase in wages, health and safety, social cohesion, environmental protection, etc. Finally, in the case of Poland, it is necessary to understand Poland's position in the global value chains and especially its role in the German-Central European production chain and possibilities to move up these chains.

The main challenges faced by the Polish economy in the context of the aforementioned analyses include: the challenge of choice between moving up the existing value chains or developing own value chains, challenge of implementing a multi-level industrial development policy, challenge of adapting GVC-oriented industrial policies to the roles played by firms in these chains and challenge of combining GVC-oriented policy with smart specialisation policies. The latter challenge is particularly important in the context of implemented regional development policies.

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3 Homogeneity of Foreign Direct Investment-derived Technology Transfer Barriers across Transfer Channels. A Case Study Analysis

Tomasz M. Napiórkowski

Introduction

Foreign Direct Investment (FDI) has been a formidable force behind the economic growth of both home and host countries. In cases like Poland, FDI has been a channel for a jump to a new development curve, which allows the host to increase the pace of its economic and political transformation. The problem that host countries face is that as they continue to develop, their economic growth will stop depending on the physical capital and the number of workers. In other words, strategies like "low-cost" strategy will stop being sufficient to continue growing. Therefore, these economies should be interested in the development of comparative advantage based on medium- and possibly on high-technology goods and services. Such economies can also benefit from FDI in this endeavour; however, public and private decision makers need to put policies in place to ensure that appropriate FDIs are attracted and that benefits of these investments can be transferred and implemented. This study focuses on the latter.

The aim of this study is to test a research hypothesis that in the case of developing economies, there is a homogeneity of technology transfer barriers across technology transfer channels. If this hypothesis is confirmed, then implications of this study will allow for the concentration of private and public policy decisions to best stimulate and make use of technology transferred from FDI firms. This aim will be achieved with an analysis of primary data

on technology transfers collected from foreign firms conducting FDI in Poland. Poland, after its economic and political transformation at the end of the 20th century, is a quickly developing economy, which is continuously perceived as an attractive host for FDI. Therefore, it is a good representative case study for a group of developing economies, especially Central and Eastern European economies. Prior to the analysis of the collected data, technology is discussed from the perspective of growth theories and channels; furthermore, barriers and absorptive capacity of transferred technology are examined.

Given that (especially in the endogenous growth models) knowledge is used in the production of technology used by the final goods sector, it is important to establish definitions of both: technology and knowledge. Technology can be defined concisely as "the state of knowledge concerning ways of converting resources into outputs" (OECD 2019a), while its improvement as "new products and processes and significant technological changes of products and processes" (OECD 2019b). Knowledge is part of human capital, defined as "the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being" (OECD 2001, p. 18). Another, parallel definition, is presented, e.g., by Weresa, who presents technology as "a general technical knowledge related to particular technical areas" and knowledge as "a set of statements related to the surrounding world, which is modified with the introduction of new information" (Weresa 2007, p. 28).

The role of technology transfers

Beginning with the neoclassical school of economic growth, Solow (1956) names technology as a multiplier of a production function consisting of physical capital and the number of workers. However, the author treats technology (and savings) as determined exogenously. Given that savings are used for the accumulation of physical capital in neoclassical models, Solow's (1956) approach is rather limited from the perspective of this study. This is especially evident when an economy reaches its steady state, where its per worker output growth rate in the neoclassical perspective is equal to the growth rate of exogenous technology (Romer 2001). Ramsey (1928, also see: Koopmans 1963; Cass 1965) treats savings as determined within the economy and shows that they are a vehicle for economic agents to reach "bliss", but technology is still determined outside the economy. This model explains how individuals' economic actions affect the speed of physical capital accumulation and therefore economic growth, but the growth horizon remains limited as technology stays outside the model. Diamond (1965) treats savings as determined by income and the rate of return, but savings are still used only for physical capital accumulation and creation of return on deferred consumption. Hence, under the assumptions of the neoclassical theories

of economic growth, technology transfers are responsible for economic growth per worker when the economy reaches its steady state. As much as this suggests that economic growth can continue indefinitely, this infinite horizon is subject to the existence and willingness of sources (e.g. countries) to transfer technology. Such a solution may be the most cost-effective solution for economies where the initial cost of research sector setup is too high (see e.g.: Weil 2009). Since there is no endogenous research sector and no own knowledge is created, it is logical to say that in neoclassical growth models, transferred knowledge is associated with the assimilation of transferred technology. For this reason and on the basis on the definition of technology by OECD (2019a), in the case of the studied models, there are no transfers of knowledge *per se*, but only of technology.[1]

Shifting to an endogenous growth models perspective, Romer (1986) using the concept of learning-by-doing introduced by Arrow (1962), showed that new knowledge (needed for production and application of new technology) can be obtained by minimising associated costs (i.e. a short-term fall in production resulting from redirection of resources from the production to the research sector). This observation is important in endogenous models because these models require a share of resources to be employed in the research and not in the production of goods and services. In addition to being a source of technology, Lucas (1988) sees human capital as increasing productivity of physical capital and labour and its accumulation as a function of an already existing stock of it and investment in it. Even though Romer (1990) treats innovations (i.e. new technology) vertically, i.e. each innovation is a new good, while Aghion and Howitt (1992) take a horizontal perspective[2] implementing a creative destruction process; both models also highlight the need for investment in human capital as a source of economic growth. Higher economic growth leads to higher income, which leads to higher savings (Harris, Loundes and Webster 2002; Horioka and Wan 2007); therefore, a higher accumulation of human (and physical) capital and technology. This allows, unlike in the neoclassical case, theoretically for no limit to the level of per worker output created endogenously. If there is an endogenous research sector and the inclusion of the domestic firm in the global value chain is due to Foreign Direct Investment, then in addition to the direct transfer of technology and knowledge (Tülüce and Dğan 2014; Temiz and Gökmen 2014; Liu, Agbola and Dzator 2016; Svedin and Stage 2016; Wang and Wu 2016), there will also be an indirect path of technology and knowledge stimulation in the host economy. Specifically, through higher wages paid by foreign

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1 Even if knowledge unrelated to the transferred technology was transferred to the recipient country, it would be lost due to the lack of an endogenous research sector.

2 In the real world, it is possible to distinguish between vertical innovation and horizontal innovation; however, it is impossible to claim which innovations are pushing the technology frontier forward more. The Internet is a horizontal innovation, which has changed the world; as did the car that replaced the horse carriage (i.e. a vertical innovation).

firms (Tomohara and Takii 2011; Javorcik 2015), domestic investments in both forms of capital increase, and serve as inputs into the research sector producing new knowledge used by the intermediate goods sector to produce new technology later employed in the production of final goods. Due to the presence of an endogenous research sector and investments in domestic human capital accumulation, an economy is not dependent on the transfers of technology and knowledge and the transferred knowledge can be used as an input into the domestic production of technology.

Romer (1990) along with Aghion and Howitt (1992) see the need for new technology and knowledge to create above-average profits (similarly to the perspective on the rate of return on savings, i.e. deferred consumption by Diamond 1965). This means that transfers of technology will change the market structures, in which they take place. From the microeconomic perspective, the transfers impact the receiving firm generally in two ways: reduction of average total costs or goods/service differentiation through, e.g., new features or higher quality. In both cases, the receiving firm should gain an advantage and therefore achieve above-average profits.[3] If the receiving firm operates in a perfectly competitive market and new technology will lead to lower average total costs, the firm will achieve profits as price will be higher than the new average total cost. This profit will be maintained until innovation arrives at the market or there is a diffusion of the profit-granting technology and knowledge to other firms. The diffusion of technology will allow new firms to enter the market, which will return the perfectly competitive market into its equilibrium. If the described transfers lead to product differentiation, the market structure will change from a perfect competition to a monopolistic competition and the obtained technology will act as an entry barrier (see e.g. Hoskisson 2008) or at least as a source of competitive advantage. A similar effect will be seen if the receiving firm starts in a monopolistic competition or an oligopoly[4] market structure. The firm will temporarily achieve higher profits due to attracting more customers with product differentiation and/or obtain higher profits due to lower average total costs. It is possible that the analysed transfers will create a monopoly. However, because the transferred technology is new to the market, but not new to the world[5], the created monopoly will be a local monopoly only. Also, since the diffusion of knowledge is inevitable, a monopoly created with technology transfers will be a temporary monopoly. This means that the studied transfers can increase or decrease competition in the domestic market.

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3 This assumes that the transferred technology is not freely available.

4 Due to product differentiation, oligopoly will change to a monopolistic completion.

5 It is very unlikely that any firm which has paid the cost of knowledge and technology development would transfer new to the world technology or knowledge to its partners.

The elements of technology transfer process

The process of transferred technology impacting the level of technology in a host country is a two-stage process. First, there is a transfer of technology and then its diffusion. The idea that transfers and diffusion should be distinguished from one another is highlighted by Kuzel (2007), while Ciborowski (2016) provides an overview of the studied process from the step-by-step perspective (the identification of partner's needs, the subject of the transfer to post transfer feedback etc.). Smeets (2009), who (when talking about transfers and the diffusion of knowledge) provides a very direct definition of transfer as a "purposeful or intended diffusion ... from one firm to the other, which creates no externality" (Smeets 2009, p. 109). Salim, Razavi and Afshari-Mofrad (2017) provide a clear definition of spillovers (originally as they refer to technology): "spillover refers to the beneficial impacts of new technological knowledge on the productivity and technological capability of other firms or countries" (Salim, Razavi and Afshari-Mofrad 2017, p. 209). Newman, Rand, Talbot and Trap (2015) further differentiate spillovers into: "horizontal, or intra-sector, spillovers ... [as] those that result from knowledge and technology used by FDI firms transferred to competing firms in the same sector ... [and vertical], or inter-sector, spillovers ... [as] those that transfer through the supply chain from foreign intermediate suppliers to domestic producers or more commonly from foreign-invested firms to domestic input suppliers" (Newman, Rand, Talbot and Trap 2015, pp. 168–169).

The portrayal of transfer as a purposeful or intended diffusion suggests that it can only be conducted through official channels (e.g., demonstration, training), which excludes for instance labour mobility. Later, the diffusion of transferred technology and knowledge on the other hand can take place through all types of channels. The analysis of literature from the perspective of channels identification has led to a concentrated list, which is an indication of a consensus among the researchers (see Table 1).

An important role in the transfer of technology process is played by absorptive capacity[6] (Borensztein, De Gregorio and Lee 1998; Crespo and Fontoura 2007; Iamsiraroj and Ulubaşoğlu 2015), which acts as a moderator. Therefore, it is possible to classify its elements as they constitute the list of barriers to a successful transfer. Glass and Saggi (1998), Lall and Narula (2004) and Velde (2006) point to the lack of human capital (chiefly education or training, but – per Azam and Ahmed 2014 – also to health) and to a technological gap as possible factors inhibiting the transfer of technology, especially that of the cutting edge. Similarly, Blomström and Sjöholm (1999) mention that benefits of such transfers

6 Absorptive capacity can be understood as "the ability of a firm to recognise the value of new, external information, assimilate it, and apply it to commercial ends is critical to its innovative capabilities" (Cohen and Levinthal 1990; definition later adopted by e.g. Apriliyanti and Alon 2017).

cannot be realised if the technological gap between the foreign firm and the domestic partner is too large and Qian and Acs (2013) also highlighted the crucial role of human capital. Vega-Jurado, Gutierrez-Gracia, and Fernandez-de-Lucio (2008) point out that absorptive capacity also depends on organisation factors like: 1/ organisational knowledge, 2/ the level of formalisation and 3/ the mechanism of social integration (that aims to limit the barriers in the process or information flow in the firm). Murovec and Prodan (2009) add to this list e.g. cooperation in innovation and firm's general approach to change. Schmidt's (2010) observations fall in line with the conclusions of Lucas (1988) as Schmidt – in addition to organisational factors like structure and approach related to human resource management – sees the aforementioned knowledge and individual abilities as determinants of absorptive capacity. This notion is supported by Lichtenthaler (2016), who shows that the type of knowledge (i.e. technology and market oriented) also is important.

Table 1. Summary of the results of literature study on channels of technology transfer and spillovers

Channels	Source
Labour mobility/turnover	OECD 2002; Glass and Saggi 2002; Sinani and Meyer 2004; Lall and Narula 2004; Crespo and Fontoura 2007; Liu and Buck 2007; Liu 2008; Salim, Razavi and Afshari-Mofrad 2017
Demonstration/imitation	Crespo and Fontoura 2007; Liu and Buck 2007; Michorowska 2012; Kim, Lee and Lee 2015; Salim, Razavi and Afshari-Mofrad 2017
Training	Salim, Razavi and Afshari-Mofrad 2017
Observation	Liu and Buck 2007; Liu 2008
Export	Crespo and Fontoura 2007; Liu and Buck 2007
Import	Liu and Buck 2007
Competition	Blomström and Sjöholm 1999; Crespo and Fontoura 2007; Michorowska 2012; Kim, Lee and Lee 2015
Cooperation[a]	OECD 2002; Sinani and Meyer 2004; Lall and Narula 2004; Crespo and Fontoura 2007; Liu and Buck 2007; Liu 2008; Michorowska 2012; Newman, Rand, Talbot and Trap 2015; Kim, Lee and Lee 2015; Salim, Razavi and Afshari-Mofrad 2017

[a] Cooperation includes cooperation in value chains (horizontal and vertical) also backward and forward linkages, contractual agreements, business transactions, working among MNEs and internationalisation of processes (e.g. R&D)

Source: author's material based on the sources listed in the table.

A case study of Poland

Poland is one of the most attractive countries for foreign investors. In 2018, inward FDI flows equaled to 1.96% of the Polish GDP and inward FDI stock to 39.57% of it. For comparison, world averages took values of 1.52% and 37.90% respectively (UNCTAD 2020). Poland is also a country, in which inward FDI has played a significant role in its economic

transformation and economic growth (Popescu 2014). Additionally, the Polish economy is one of the fastest growing economies. For example, the annual growth of GDP *per capita* in 2018 in Poland was equal to 5.14%, and for the European Union it was 1.81% (World Bank 2020). Based on these observations and conclusions made when discussing the role technology transfers in the light of economic growth theory Poland is an interesting case study for the topic of technology transfers.

In 2017/2018, the Computer Assisted Telephone Interview method was used to collect primary data on 302 FDI firms in Poland that transferred technology to Polish firms.[7] Population was represented by FDI firms in Poland and consisted of 2,358 firms (Polish Investment and Trade Agency 2017), yielding 5.27% margin of error at a 95% confidence level.[8]

Table 2. Channels used in the technology transfer from a foreign firm to a domestic firm

Channel	Demonstration	Training	Collaboration with firms up the value chain	Collaboration with firms down the value chain	Knowledge transfer
% of n	21.52%	54.64%	18.54%	8.28%	65.23%

n = 302, more than one answer was possible.

Source: author's material based on the collected data.

From the listed five possible channels of technology transfer (Table 2), transfer of knowledge proved to be the most popular means (65.23%); followed by training (54.64%). Interestingly, demonstration and collaboration with firm up the value chain and separately down the value chain were selected sparingly (21.52%, 18.54% and 8.28%, respectively). These results show that, in addition to being the subject of transfer, knowledge can be a channel for the technology transfer. The observation that transferred knowledge is associated with the assimilation of the transferred technology falls in line with observations made when discussing neoclassical growth theories. Therefore, it can be hypothesised that knowledge transferred from FDI to Polish firms is not an input into the Polish endogenous research sector and the impact of these technology transfers is best described from the neoclassical growth theories' perspective.

In terms of barriers to a successful technology transfer (Table 3), administrative (47.68%) and legal (32.45%) are outliers as other barriers are incomparable: lack of human capital readiness (16.23%), lack of physical capital readiness (9.93%), technology gap (4.64%) and

7 Data collection was financed with funds obtained from the "Konkurs na zadania badawcze i prace rozwojowe służące rozwojowi młodych naukowców (wiek do 35 lat) oraz uczestników studiów doktoranckich na rok 2017".

8 This specification information is based on n=302 and N=2,358. It was not possible to estimate the fraction of the entire population consisting of only FDI firms that transferred technology to Polish firms. The population and the list of possible respondents was defined according to the document "List of Major Foreign Investors in Poland – December 2015", which was the most up-to-date list at the time the study was conducted.

financial (3.97%) with 10.93% of firm declaring no barriers. As can be seen, key identified barriers are not connected with elements of human capital. The legislative and administrative environment are key hindrances. Such a result is a strong signal to policymakers to introduce changes which would lower these barriers. The obtained results fall in line with the observations and conclusions of the report on ease of doing business conducted by the World Bank (2019) and a comprehensive report by Dzienis, Kowalski, Lachowicz, Mackiewicz, Napiórkowski and Weresa (2018).

Table 3. Barriers in the technology transfer from a foreign firm to a domestic firm

Barrier	Lack of physical capital readiness	Lack of human capital readiness	Technological gap	Administrative	Legal	Financial	None
% of n	9.93%	16.23%	4.64%	47.68%	32.45%	3.97%	10.93%

n = 302, more than one answer was possible.

Source: author's material based on the collected data.

Table 4. Barriers in technology transfer from a foreign firm to a domestic firm across the channels used

Channel/Barrier	Lack of physical capital readiness	Lack of human capital readiness	Technological gap	Administrative	Legal	Financial	None
Demonstration	7.7%	15.4%	7.7%	38.5%	35.4%	7.7%	13.8%
Training:	8.5%	18.2%	6.1%	46.1%	30.3%	4.8%	12.1%
Collaboration with firms up the value chain	16.1%	21.4%	10.7%	25.0%	19.6%	12.5%	21.4%
Collaboration with firms down the value chain	12.0%	36.0%	24.0%	32.0%	20.0%	20.0%	0.0%
Knowledge transfer	12.2%	16.2%	4.1%	47.7%	34.5%	3.6%	12.7%

n = 302, more than one answer was possible.

Source: author's material based on the collected data.

Crossing channels with barriers (Table 4), it is visible that administrative barriers are the key barriers across all listed channels. At the same time, when the transfer is conducted via collaboration with firms down the value chain, a lack of human capital is the key barrier to a successful technology transfer (36%). This is also the second (21.4%) key barrier to foreign firms collaborating with Polish firms up the value chain. Also in case of collaboration down the value chain, technological gap (24%) is much more important than in the case of other

channels. Therefore, in terms of technology transfer to Polish firms through collaboration within the value chain, traditional literature-derived barriers of human capital and technology gap play a more important role than in the case of other technology transfer channels.

Conclusions

The study has examined the role of technology for the receiving economy from the perspective of two major families of growth theories. It has also shown that the literature provides a wide range of possible channels as well as possible barriers to a successful technology transfer from a foreign to a domestic firm.

These steps, accompanied by a case study of Poland as a representative of a fast growing developing economy, attractive to FDI allowed the author to conclude that in the case of developing economies, administrative barriers are generally crucial across all transfer channels. With regard to the other studied barriers, they tend to depend on the transfer channel used. When technology is transferred through collaboration with firms down the value chain, the lack of human capital turned out to be the key issue at hand. The same barrier is also noteworthy when collaborating with firms up the value chain. Lastly, when technology was transferred through training and demonstration, legal barriers were of second concern. Therefore, the research hypothesis claiming that there is a homogeneity of technology transfer barriers across technology transfer channels was not confirmed.

The presented results have a practical application in three interest groups. First, policymakers; in addition to traditional actions aimed at attracting FDI, policymakers should consider introducing solutions which would ease the administrative barriers faced by foreign investors. Policymakers should also think about supporting businesses in human capital development and technology production or acquisition. Business owners, who are the second interest group, should consider introducing more training and education as means of increasing their workers' human capital. If such programs exist, business owners should also make an active use of any aid provided by the public sector in building their absorptive capacity. Lastly, the obtained results show that as much as foreign investors should be ready for administrative barriers regardless of the channel, other barriers tend to depend on the transfer channel used. For example, when the foreign firm decides to transfer technology to the local firm through collaboration within the value chain, they should account for the lack of human capital.

The study also concludes that technology is a significant factor of production in both neoclassical and endogenous growth theories; however, its importance is greater in a case without an endogenous research sector. Secondly, due to the complexity of FDI impact on the host economy, for a host with an endogenous research sector there also exists a residual

path of endogenous research process stimulation, i.e. via labour market stimulation. Thirdly, transfer of technology can either increase or (temporarily) decrease competition in the domestic market. Most interestingly however, the study finds that as much as the classic barriers represented by elements of absorptive capacity proved to be of significance when the studied transfers are conducted through collaboration within the value chain, overall key identified barriers represent the administrative and legal environment present in the receiving country.

This study can be treated as one providing background for further studies undertaking the topic of technology transfers, and their impact on the receiving firm and the entire host economy. The study also arrives at applicable conclusions regarding the role of private and public policy makers in creating a technology transfer-friendly environment. Further studies could repeat the empirical part presented here in countries like Poland, e.g. other three members of the Visegrád Group.

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PART TWO

Empirical Analysis of the Polish-German Case Study

Part Two of this book consists of five separate texts. Each of them undertakes a specific element of the Polish-German economic and political relationship; beginning with a general analysis of the position of Poland in the global value chains and ending with the policy development and analysis.

This part consists of five texts:

1. "Poland's Position in the Global Value Chains between 2004 and 2014" by Krzysztof Falkowski,
2. "German-Polish Trade Relations from the Perspective of Trade in Value Added with Specific Focus on Trade in Digital Technologies" by Andreas Bielig,
3. "German-Polish Trade after 2004 and the German FDI in Poland and the Polish FDI in Germany. Comparative Analysis" by Katarzyna Kamińska,
4. "Challenges in Sustaining Germany's Export-oriented Economic Model" by Jurgen Wandel,
5. "German's and Poland's Positions on the New EU Industrial Policy. Common and Conflicting Interests" by Adam A. Ambroziak.

4 Poland's Position in the Global Value Chains between 2004 and 2014

Krzysztof Falkowski

Introduction

Dynamic processes of globalisation, internationalisation of economic activity, coopetition or ICT revolution observed in today's global economy, along with the liberalisation of economic relations, lead to changes in the degree and character of international economic connections, and significantly determine the level of economic and social development of every country. As a consequence, the increasing competition in the international markets of goods and factors of production, which actually affects companies as well as national economies as a whole, and a more distinct diversification in the level of development of every country in the world are becoming a growing challenge (Hämäläinen, 2003).

Importantly, however, these processes also make significant changes in the busines-related conditions, including transaction costs. And the dynamically developing international competition, also in terms of business location conditions, to a large extent, enforces their decline. It is also a consequence of a declining risk related to the establishment and maintenance of contacts between companies from different countries, more effective coordination of international joint ventures as well as more effective control of production processes related to them (Kuźnar, 2017). All this means that an increasing proportion of trade, including foreign investment, is carried out within the framework of the global value chains (GVCs). Thus, exported goods and services contain a significant contribution of value (value added) of intermediate goods coming from abroad. In the reality of today's globalised

economy, it is rare for a country to specialise in the production of a specific product (good or service) creating the entire value chain. Naturally, the Polish economy and Polish companies also participate in all these processes.

Defining initially the term global chains itself, it is worth noting that a value chain means any activity undertaken by companies and employees from the moment the product (good or service) is created until its final use, and which eventually determines the value that the company provides to the environment (economy) (Kuźnar, 2017). T. Rojek, on the other hand, defines value chains as a process of "adding" value to a product, beginning with the company purchases of raw materials, materials, semi-finished products, etc., necessary for the production process. Thus, the value chain includes production, logistics, marketing and ends with providing customers with additional services (Rojek, 2014).

On the other hand, when talking about global value chains, which is the subject of this study, we mean the situation where companies from different countries of the world are involved in different stages of the aforementioned process as well as different geographical locations, where a specific product creation stage takes place (Humphrey, Schmitz 2002; Gereffi, Humphrey, Sturgeon 2005).

The purpose of this study is to attempt a synthetic assessment of Poland's place in the global value chains.

This study advances a thesis that, over the period of 2004–2014, Poland's role as a supplier and subcontractor for foreign companies increased much more than a role of a recipient of value added used to manufacture products (goods and services) for export.

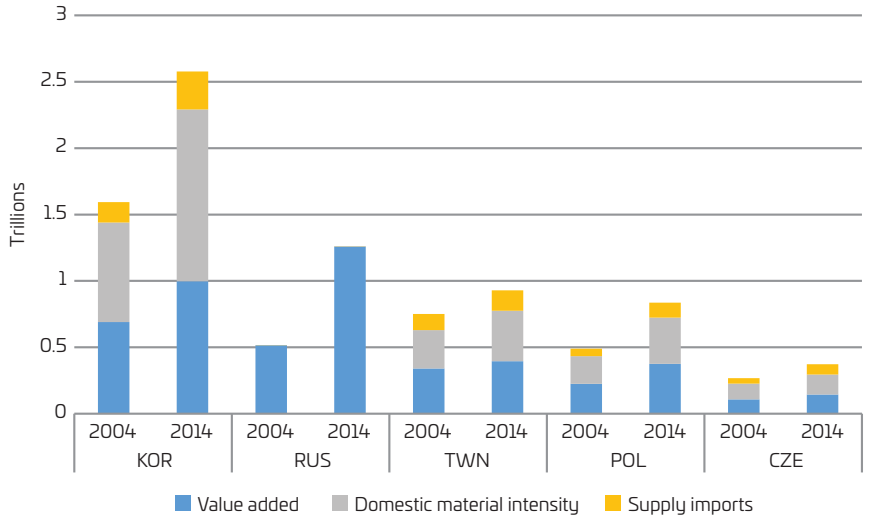
In the process of preparing this analysis of Poland's place in the global value chains, the data from the World Input-Output Database (WIOD) were used, prepared for research by the World Economy Research Institute in 2019 as part of the project *One Belt-One Road. A new silk road to a multipolar global economy?* The prepared analysis covers the period 2004–2014, which is determined by the availability of the WIOD data.

Global production structure in Poland in 2004 and 2014

To begin with, it should be indicated that Poland gradually built its position in the world economy in the analysed period. Poland's output increased from 490 billion dollars in 2004 to more than 830 billion dollars in 2014. In the category of value added, which has a direct impact on the value of the country's GDP – the Polish economy gained quite a lot over the same period, i.e. as much as 67% (there was an increase in this range from over 225 billion dollars to over 376 billion dollars). However, despite such a significant increase in total value added in the Polish economy, Poland did not gain as much in this regard as the other so-called medium-sized economies, e.g. the economy of South Korea or Russia (Figure 1).

In addition, there was also a significant growth of 65.2% in the national material intensity in Poland (from about 208 billion dollars to about 343 billion dollars). However, what deserves a particular emphasis is the fact that between 2004 and 2014, the Polish economy significantly increased its dependence on supply imports; while in 2004 the value of supply imports in Poland was amounted to 56 billion dollars, in 2014 it was already about 112 billion dollars. This meant a double value in just 10 years. Interestingly, the contribution of supply imports from China to this increase was relatively large. It increased by little over 7 times, from 750.6 million dollars in 2004 to 5.3 billion dollars.

Figure 1. Global production structure in Poland compared to selected economies in 2004 and 2014 (in the USD trillions)



Source: author's material based on the World Input-Output Database.

Referring to the structure of Polish supply imports, it should be noted that the economies of the European Union traditionally attached a great significance to it. Nevertheless, China's importance was on the rise, which has already been mentioned.

Share of intermediate goods in Polish imports between 2004 and 2014

A relatively high degree of the share of Poland in the global value chains is shown in the data presented in Table 1, relating to the share of intermediate goods in Polish imports. It is worth noting here that intermediate goods include unprocessed beverages and food for

industry, processed beverages and food for industry, unprocessed industrial goods not included in other sectors, processed fuels and lubricants, capital goods (except for means of transport and parts) and their accessories and transport parts and accessories.

Table 1. Share of intermediate goods in Polish imports between 2004 and 2014 (in %)

Import from:	2004	2008	2010	2014
Within the EU-28	61.0	57.8	58.4	54.7
Outside the EU-28	70.5	62.8	62.6	61.8
World	63.3	59.2	59.6	56.8

Source: author's material based on the Eurostat data.

However, it is worth noting that the importance of intermediate goods in Polish imports, measured by their share, decreases quite significantly from year to year. If, for example, we take into account the share of intermediate goods in total Polish imports; while it was 63.3% in 2004, it was only 53.9% in 2018. The same trend occurred in Polish imports of intermediate goods divided into imports from the EU28 countries and those outside the EU28.

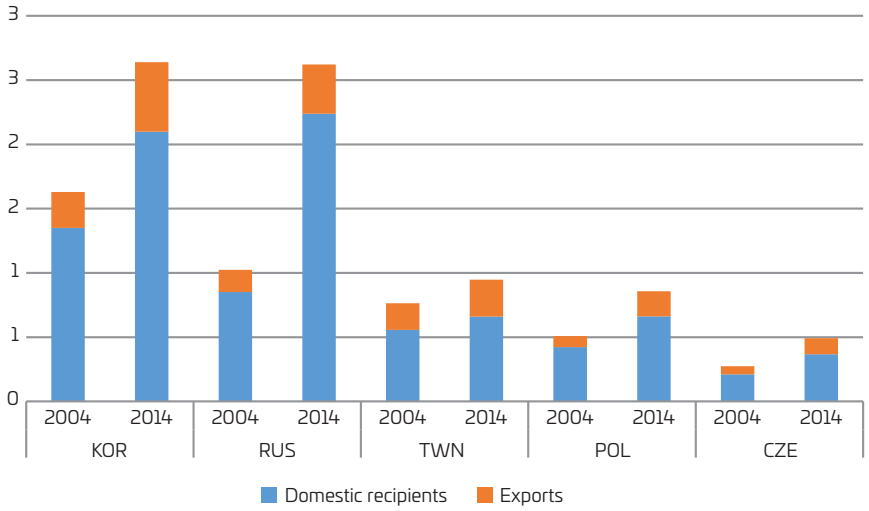
A long-term declining share of imports of intermediate goods in Polish imports in general may indicate an improvement in the modernity of the Polish economy (less dependence on imports of components from abroad) and an increase in the wealth of society (as this decline is accompanied by an increase in the share of consumer goods) (Kuźnar, 2017).

Recipients of global output in Poland in 2004 and 2014

Analysing the data on the so-called forward participation, it should be noted that Poland significantly increased the value of its exports between 2004 and 2014 (Figure 2). This figure was 422.6 billion dollars in 2004 and it came up to 662.1 billion dollars in 2014. It meant an increase of 57%. Admittedly, this increase was not as impressive as in China, Russia or South Korea, but it nevertheless showed a significant improvement in the position of the Polish economy in the international labour division over the period of 2004–2014 and it should be given an absolutely positive assessment.

Also noteworthy is the increase in the share of domestic recipients in total output, which was undoubtedly a consequence of the dynamic development of the Polish economy and the increase in the real purchasing power of Polish consumers, in both household and corporate sectors.

Figure 2. Recipients of global output in Poland compared to selected economies in 2004 and 2014 (USD billions)



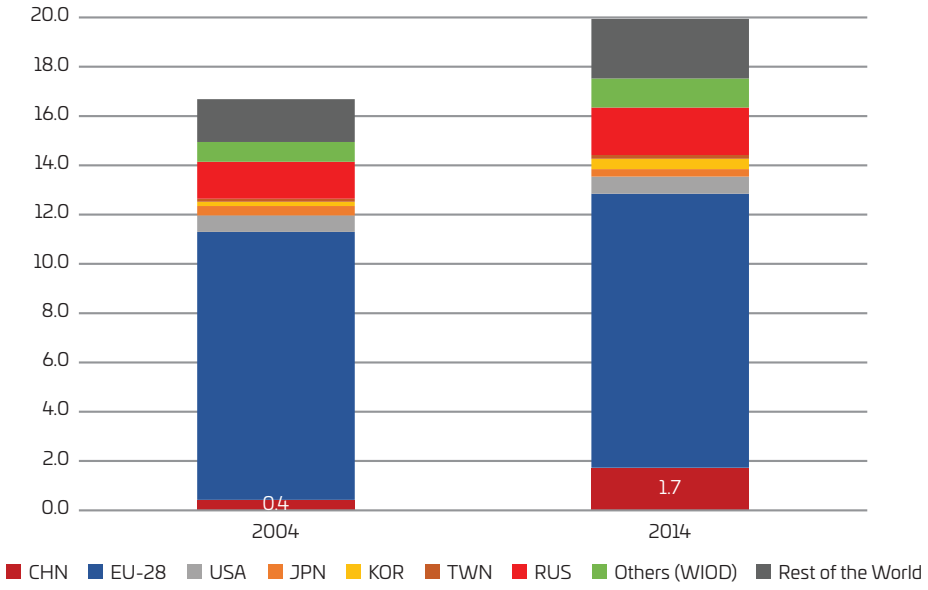
Source: author's material based on the World Input-Output Database.

Foreign value added in the exports of goods from Poland and the recipients of domestic value added embodied in foreign final goods in 2004 and 2014

The foreign value added in exports of goods from Poland turns out to be generally very small in the analysed period, as it oscillated around 2% in 2014 (Figure 3). However, in the period 2004 and 2014, the analogous value in 2004 was slightly over 1.65%. Definitely, the foreign value added in Polish exports was traditionally most significant in relation to the EU28 countries, where value added in Polish exports of goods amounted to 10.9% in 2004 and 11.1% in 2014. To a large extent, it comes as a consequence of Poland's membership of the European Single Market within the EU and more generally, our membership of the European Union

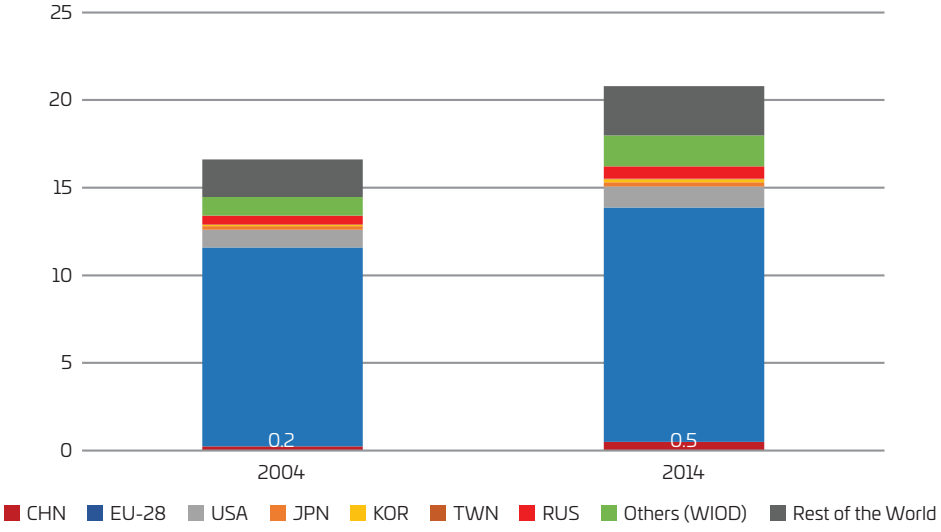
Similarly, the EU28 member states played the most important role in the analysed period 2004–2014 as the main recipients of national value added embodied in foreign final goods (Figure 4). In 2004, this share was 11.4%, while in 2014 it increased slightly to 13.4%. Poland's relatively important partner in this regard was traditionally the US economy, but the corresponding share of this country amounted to 1% and 1.2% respectively.

Figure 3. Foreign value added in exports of goods from Poland in 2004 and 2014 (%)



Others (WIOD): Australia, Brazil, India, Indonesia, Canada, Mexico, Norway, Russia, Switzerland, Turkey.
Source: author's material based on the World Input-Output Database.

Figure 4. Recipients of domestic value added embodied in foreign final goods in Poland in 2004 and 2014 (in %)



Others (WIOD): Australia, Brazil, India, Indonesia, Canada, Mexico, Norway, Russia, Switzerland, Turkey.
Source: author's material based on the World Input-Output Database.

According to the data presented in Figure 4, the total foreign value added embodied in domestic (Polish) final goods increased from 17% to 21% between 2004 and 2014. Thus, the value added embodied in domestic (Polish) final goods decreased during this period, from 83% to 79% respectively.

Industry structure of foreign added value in the Polish economy in 2014

Referring to the industry structure of foreign value added in the Polish economy, it should be noted that processing industries have the largest share of foreign value added in Polish exports (actually, they had it in 2014) (Table 2). In particular, the production of computer, electronic and optical products (up to 54%), the production of cars, trailers and semi-trailers (43%) and the production of electronic equipment (41%). The reason behind it was an absolute necessity to use foreign technologies in the production of goods within this category, which clearly involved direct investments in the Polish economy of foreign transnational corporations.

Table 2. Industries of the Polish economy with the highest content of foreign value added in 2014

Item	Industries	Foreign value added in gross exports
1	Production of computer, electronic and optical products	54%
2	Production of cars, trailers and semi-trailers	43%
3	Production of electronic equipment	41%

Source: author's material based on the World Input-Output Database.

Table 3. Industries of the Polish economy with the largest share of foreign producers of final goods as recipients of domestic (Polish) added value in 2014.

Item	Industries	Share of foreign recipients in value added
1	Air transport	76%
2	Production of base metals	70%
3	Production of electronic equipment	58%

Source: author's material based on the World Input-Output Database.

As regards the recipients of Polish value added who are foreign producers of final goods, in this case too, the highest values of the share referred to two processing industries, i.e. production of base metals (70%) and production of electronic equipment (58%) (Table 3).

Nevertheless, air transport (76%) was the leader in terms of the share of foreign recipients in Polish value added.

The position of Polish economy in the world value chains compared to selected countries in 2004 and 2014

In conclusion, it is worth referring the Polish economy to other selected economies of the world, with a large share of industrial production (plus Russia), analysing its share in the global value chains, using three basic indicators, i.e. the indicator of foreign value added in gross exports, the indicator of foreign recipients share in value added and the indicator of embodiment of domestic value added in foreign final goods (Table 4).

Table 4. The position of Polish economy in the world value chains compared to selected countries in 2004 and 2014 (in %).

	Foreign value added in gross exports		Share of foreign recipients in value added		Embodiment of domestic value added in foreign final goods	
	2004	2014	2004	2014	2004	2014
China	13	8	14	13	25	21
Germany	12	16	15	18	26	31
Japan	6	11	6	8	11	13
South Korea	15	19	16	22	27	33
Poland	**17**	**20**	**17**	**21**	**24**	**33**
Russia	9	10	21	19	24	21

Source: author's material based on the World Input-Output Database.

It follows explicitly from the data presented in Table 4 that the dynamics of the development of indicator of foreign value added in gross exports in 2004–2014 in Poland and other economies taken into account developed in a similar way. China was the only exception. All of them showed a trend of increased supply in raw materials, materials, semi-finished products (intermediate goods) abroad, with the growing share of foreign value added in exports (and the final product). In the case of Poland, this share increased from 17% in 2004 to 20% in 2014. It is worth pointing to China in this context, as this country experienced the opposite trend during the analysed period, i.e. the share of value added of foreign suppliers of semi-finished products decreased quite significantly from 13% in 2004 to only 8% in 2014.

As regards the direction of change, there were similar data on the extent of dependence on foreign producers of final goods, taking into account the share of foreign recipients in added value. Interestingly, it is by far the largest in smaller economies such as Poland and

South Korea. In this respect, there was also an increase in this share in all the analysed countries, except for China (in Poland from 17% in 2004 to 21% in 2014).

If we focus on the indicator of embodiment of domestic value added in foreign final goods, also in this regard, the recorded changes in Poland over the period 2004–2014 are not exceptional. However, of all the countries indicated, Poland recorded the largest increase in this area (of as much as 9 percentage points).

Summary

A dynamic and high development of the Polish economy, observed for years, resulted largely from an increase in the involvement of the labour factor together with a growing domestic demand, which was facilitated by the social policy of the Polish government as well as the international determinants, including Poland's membership of the European Union. At the same time, the efficiency of factors of production (labour, capital) in the Polish economy was on the rise. However, it remains much lower than in West European countries. The reasons behind it can be found in Poland's specialisation in the international division of labour, due to which, in the vast majority, we produce and export relatively simple goods with relatively low technological advancement and value added, and we import high-tech goods with high value added. Another important reason for this diagnosis of the situation is that actually Polish companies focus on the so-called "middle" elements of global value creation chains. Most often they carry out only the production process (or assembly process), often on behalf of a foreign customer. Unfortunately, such a positioning in the global value chains, as the experience indicates, is in the long run exposed to the risk of being reduced or even "falling out" of such a chain by shifting production (assembly) to another country with relatively lower labour or capital costs.

From the point of view of the future position of Poland and Polish companies in the global value chains, it is absolutely necessary, which does not mean easy, to try to change this place from the so-called "middle" elements of the global value chains towards the beginning or end of these chains. They do not only bring relatively the greatest profits, but also create a real environment for economic and social development, especially for a country like Poland, i.e. one that is threatened with a real middle income trap. Moreover, the functioning at the beginning of the global value chain., especially high-tech sectors, gives rise to (and at the same time forces) the development of all R&D facilities, which would also trigger the desired spillover effect in the Polish economy. On the other hand, positioning at the end of the global value chains would give Polish companies the opportunity to render, for example, any pre- and after-sales services, which with today's very shortened life (usability) of many goods would provide them with a relatively constant, additional source of revenue.

It is fair to say, however, that for the time being Polish companies (mainly those from the SME sector) and our economy as a whole are unfortunately characterised by relatively low levels of innovation, with regard to technology and processes and organisation. On the other hand, the labour costs in Poland are still much lower compared to most countries of the European Union, and the quality of human resources is relatively increasing high, which, in addition to the size of the market with a growing real purchasing power of the Polish society, makes Poland an attractive place to place capital, also in the context of offshoring activities. In this area, the development offshoring services, also thanks to the development of ICT, is of particular importance. These technologies have led to a decline in the cost of coordination of different service chain links, which can be dispersed in many distant countries. And this gave the Polish economy a chance to become a center of services for businesses with foreign capital, which most often serve clients from the financial and insurance sector around the world. Poland has notably made use of this opportunity.

In conclusion, the analysis of Poland's position in the global value chains shows that over the period 2004–2014, Poland's role as a supplier and subcontractor for foreign companies increased much more than as a recipient of value added used in the exports of goods and services. This shows Poland's real position in today's global value chains. Thus, the thesis formulated at the beginning of the study has been confirmed in the course of the conducted analysis.

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5 German-Polish Trade Relations from the Perspective of Trade in Value Added with Specific Focus on Trade in Digital Technologies

Andreas Bielig

Introduction

German-Polish trade relationships have developed in the last decades and especially dynamically since the beginning of membership of Poland in the European Union. Trade volumes increased dramatically and both economies participated in intensified processes of labour division (e.g. Czarny et al., 2016). Parallelly to these processes, both neighbouring countries established also comprehensive bilateral supply chain networks as a part of global networks with the target of further improvement of their competitiveness in global trade. As a result, trade volumes increased, following these processes of economic cooperation. To measure individual economic contributions to the exchange of goods and services economists suggest combining trade volume analysis with analysis of value added (among others Grodzicki et al., 2016). In this article, I analyse the development of trade between Germany and Poland between 2005 and 2015 in terms of trade volumes (exports and imports) and value added on the national and sector level. The research question is, if the current trade pattern of German-Polish trade contributed to improvements of the bilateral trade relations in support of technological progress to climb the technological ladder. I use the cases of German global trade and German-Polish trade as benchmarks to compare developments at sector level in selected areas. Further, I analyse the bilateral trade in digital products to receive a close picture of trade developments in technological fields of high relevance for

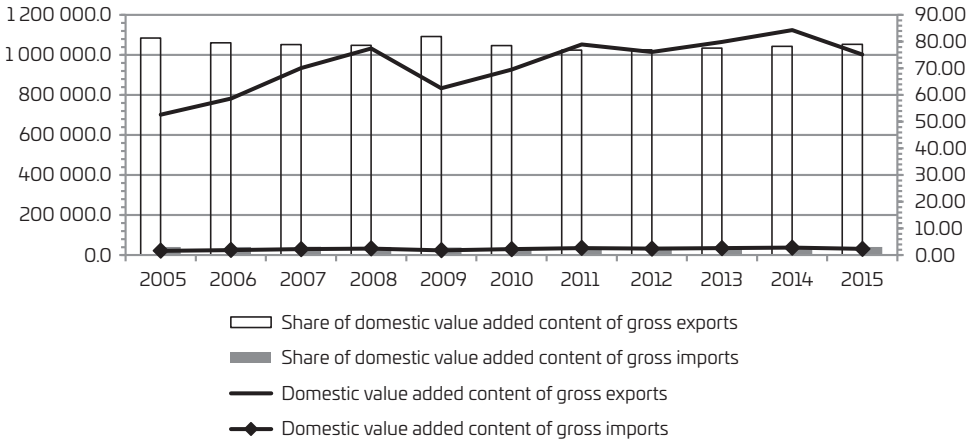
the processes of digitalisation in economy and society as well as future transformation into new structures of production and consumption, which are essential for future competitiveness. The data sources are the international OECD database Trade in Value Added and the Federal Statistical Office Destatis for the bilateral trade in digital technologies.

The benchmark I – Trade between Germany and the Rest of the World

In the analysed period from 2005 to 2015, Germany intensively expanded its trade in the global perspective, gross exports to the Rest of World economies increased from $861.9 billion by 47.2% to $1,268.2 billion (OECD, 2019a). In this time, growth varied substantially, from 20.52% in 2007 to –22.42% in the year of crisis 2009. The export maximum was reached in 2014 with $1,436.1 billion. Also total gross imports expanded similarly, from $718.4 billion by 41.5% to $1,017.0 billion, with the growth peak of 18.6% in 2010 and trough of –21.86% again in 2009 (OECD, 2019b). Here, the import maximum was reached in 2011 with a traded volume of $1,198.2 billion. The domestic value added content of gross exports from Germany to the Rest of World economies increased in the period from $701.1 billion in 2005 by 42.91% to $1,002.0 billion in 2015 (OECD, 2019c), so the value added content growth was slightly smaller than that of exports (see Figure 2). Also in value added the growth rates revealed a substantial array between 19.57% in 2007 and –19.19% in 2009. In comparison with exports, the domestic value added content of gross imports started its increases from substantially lower levels of $21.7 billion in 2005 and moved up by 43.35% to $31.2 billion in 2015 (OECD, 2019d). Here, also the growth rates showed a strong volatility with the peak of 23.41% in 2010 and trough of –27.05% in 2009. Resulting from the development of the singular key aggregates, exports respective imports and domestic value added content of both variables, the shares of value added followed visibly a stable sideward trend (see Figure 2). The share of domestic value added content of gross exports decreased slightly by –2.88% from 81.36% in 2005 to 79.01% in 2015. The annual growth rates ranged from –4.15% in 2010 to 4.16% in 2009, showing consequently a considerable stability within a small array of amplitudes. For further analytic considerations, we can assume a priori that traded value added is by tendency statistically affected mainly by trade volumes, if value added shares are supposed to be quite stable. This assumption holds true for also imports: the share of domestic value added content developed between 2005 and 2015 nearly on a stable horizontal level around the 3% mark, starting with 3.03% and reaching 3.06% in the last year. Also, if we observe the peak of 5.72% in 2014 and trough of –6.65% in 2009, the average annual change rate 1.27% is remarkably small. Consequently,

the shares of traded value added contents of imports follow widely the traded import volumes for the German trade on the global basis in the period from 2005 to 2015.

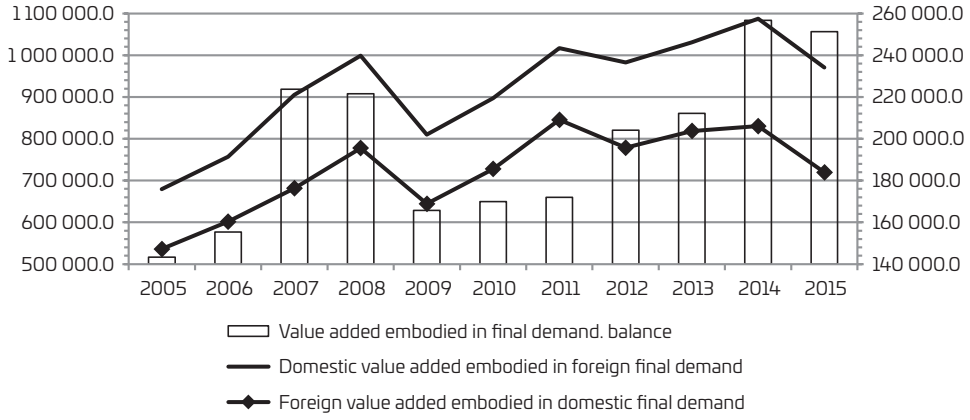
Figure 1. Domestic value added content of gross exports and imports in trade between Germany and the Rest of World 2005–2015 [USD millions] (left axis), share of domestic value added content of gross exports and imports [%] (right axis)



Source: author's material based on OECD (2019a), OECD (2019b), OECD (2019c) & OECD (2019d).

If the value added contained in final demand is considered, we obtain another picture: the domestic value added embodied in foreign final demand in trade between Germany and the Rest of World economies increased by 44.89% from $679.4 billion in 2005 to $970.9 billion in 2015 (OECD, 2019e). So the average growth rate was slightly smaller than that of gross exports but larger than that of domestic value added content of gross exports. The annual growth rates ranged from 19.57% in 2007 to –18.93% in 2009 (see Figure 2). In comparison with this, the foreign value added embodied in domestic final demand developed on a substantially smaller level. It grew from $536.0 billion in 2005 by only 34.24% to $719.6 billion in 2015 (OECD, 2019f). The annual growth rates ranged on comparable levels like that of the outlined domestic value added on foreign final demand, from –17.14% in 2009 to 16.17% in 2011. The resulting balance of both indicators, the balance of value added in final demand, increased in the analysed period disproportionally much, caused by larger initial values and higher average growth rates of the first factor. Hence, it increased by 75.26% from $143.4 billion in 2005 to $251.3 billion in 2015 (OECD, 2019 g). But there are also side effects of contrary factor developments observed, showing the array of annual growth rates of balance a substantially larger volatility and abrupt bounds (visible in 2008, /10, /12 & /15), with the peak of 44.04% in 2007 and trough of 25.19% in 2009.

Figure 2. Domestic/foreign value added in foreign/domestic final demand in trade between Germany and Rest of World 2005–2015 [USD millions] (left axis), balance of value added in final demand (right axis)



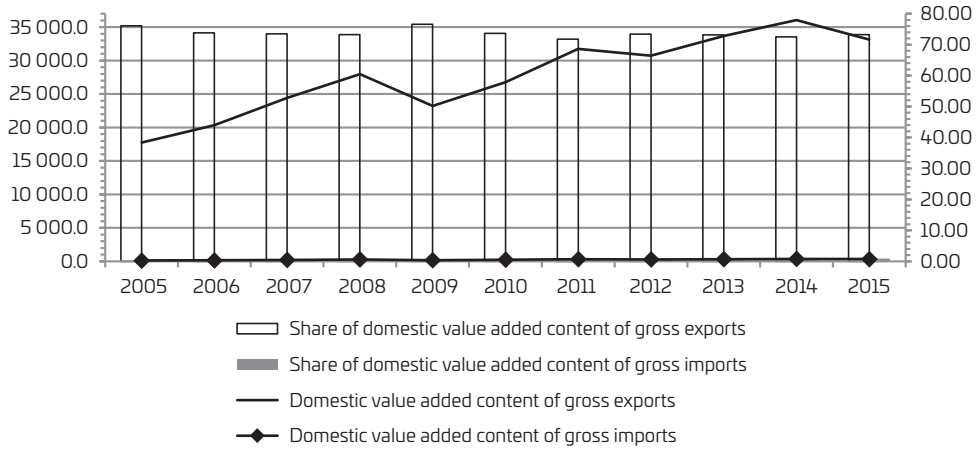
Source: author's material based on OECD (2019e), OECD (2019f) & OECD (2019g).

The benchmark II – overall trade between Germany and Poland

If we analyse overall trade between our neighbouring economies, in the same period we obtain quite a different, if not a more optimistic picture. Gross exports from Germany to Poland increased extraordinarily by 94.05% from $23.317 billion in 2005 to $45.246 billion in 2015 (OECD, 2019h). Also here, annual growth rates varied substantially, from –20.06% in 2009 to 21.61% in 2011. As in overall trade of Germany in the global perspective, the maximum exports of $49.719 billion were reached in 2014. For comparison, German gross imports from Poland showed in the same period a comparable development. They increased from $20.190 billion in 2015 by 95.9% to $39.551 billion, with a maximum value of $44.635 billion in 2008 before the beginning of crisis (OECD, 2019i). The annual growth rates ranged even more substantially than those of exports from –34.05% to 35.10%, hence in a broad interval of around 70%-points in comparison with around 40%-points in case of exports.

The development of domestic value added content of traded volumes differs from the above mentioned picture. For gross exports, the value added content increased from $17.750 billion in 2005 by 86.72% to $33.142 billion in 2015 (OECD, 2019j), consequently embedded value added couldn't keep pace with a strong expansion trend of gross exports from Germany to Poland (see Figure 3). The maximum level of value added in gross exports was reached in 2014 with $36.056 billion, a constellation like in the global trade perspective.

Figure 3. Domestic value added content of gross exports and imports in trade between Germany and Poland 2005–2015 [USD millions] (left axis), share of domestic value added content of gross exports and imports [%] (right axis)

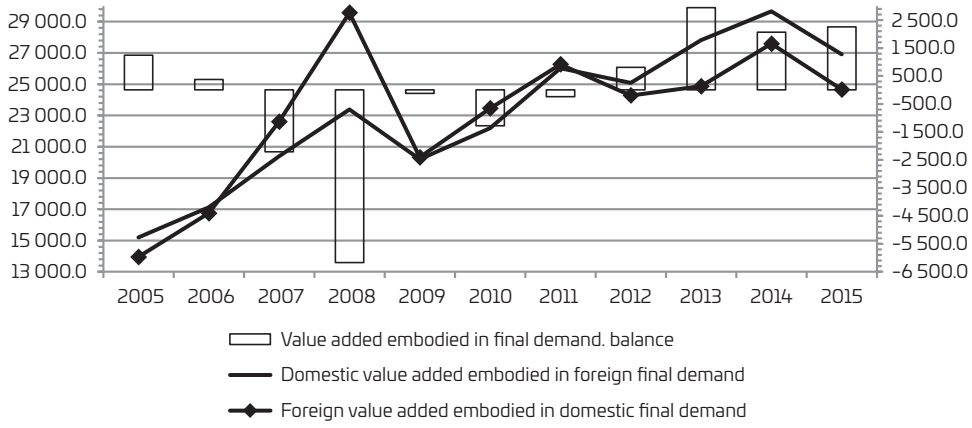


Source: author's material based on OECD (2019h), OECD (2019i), OECD (2019j) & OECD (2019k).

Annual growth rates varied substantially from –16.98% in 2009 to 20.08% in 2007. In the opposite direction, domestic value added of gross imports started its increase from significantly a smaller level but with impressive dynamics, expanding from $104.0 million in 2005 by outstanding 224.9% to $337.9 million in 2015 (OECD, 2019k). Here, domestic added value development outpaced even the large growth rates of gross imports by far, with a maximum level of $358.8 million in 2014. But also annual growth rates showed the largest volatility in this data set for the German-Polish trade, ranging from –41.06% in 2009 to 47.83% in the following year, hence they oscillated in an extreme broad interval of nearly 89%-points. In accordance with the development of the basic indicators outlined above, shares of value added in both trade directions followed different paths. The share of domestic value added of gross exports was subject to a slight decline trend, decreasing from 76.12% in 2005 by –3.78% to 73.25% in 2015. The maximum share was reached in the crisis year of 2009 with 76.57% (here, the reduction of exports outpaced the shrinking value added content development) and the minimum with 71.78% in 2011. Annual growth rates fluctuated in a very narrow interval between –3.86% in 2010 and 4.56% in 2009. Different sensitivities in crisis reaction between trade volumes and added value content caused in the latter case these anomalies of value added share development, which showed improvements during the crisis. From the author's perspective it is one of different signs of the narrow restrictions of the explanatory value of value added analysis, which can lead to serious misinterpretations, if it is not adequately combined with an aggregated analysis of trade

volumes. The development of shares of domestic value added content of gross imports confirms the assumption. They increased from a small level of 0.52% in 2005 by 65.85% to 0.85% in 2015. Their annual growth rates ranged from –10.62% in 2009 to 20.06% in the following year, indicating a normal development. But, again, in 2015 the share growth of value added of gross imports of 5.73% indicates a positive development during a recessionary situation of shrinking trade volumes and value added levels (–10.93% resp. –5.82%). By the way, for exports in that year the same misleading signal is visible from value added shares, but on a smaller level (–9% exports and –8.08% in value added content result here finally in a marginal 1% growth of value added share).

Figure 4. Domestic/foreign value added in foreign/domestic final demand in trade between Germany and Poland 2005–2015 [USD millions] (left axis), balance of value added in final demand (right axis)



Source: author's material based on OECD (2019 l), OECD (2019 m) & OECD (2019n).

If we focus on the final demand in the German-Polish trade, we find analogous developments to Germany's global goods exchange (see Figure 3). The domestic value added embodied in foreign final demand increased from $15.193 billion in 2005 by 77.19% to $26.920 billion in 2015 (OECD, 2019l). Thus, the domestic value added in final demand traded between Germany and Poland developed even more progressively than with the Rest of World economies (+32.3%-points growth in comparison). The maximum domestic value added of $29.658 billion was recorded in 2014, which is in line with the above findings about worldwide trade. Also here, annual growth rates varied substantially in the analysed period, ranging from 19.05% in 2007 to 13.64% in 2009. Even more volatility was revealed in the foreign value added embodied in domestic final demand. It increased from $13.948 billion in 2005 by 76.82% to $24.662 billion in 2015, with its maximum value of

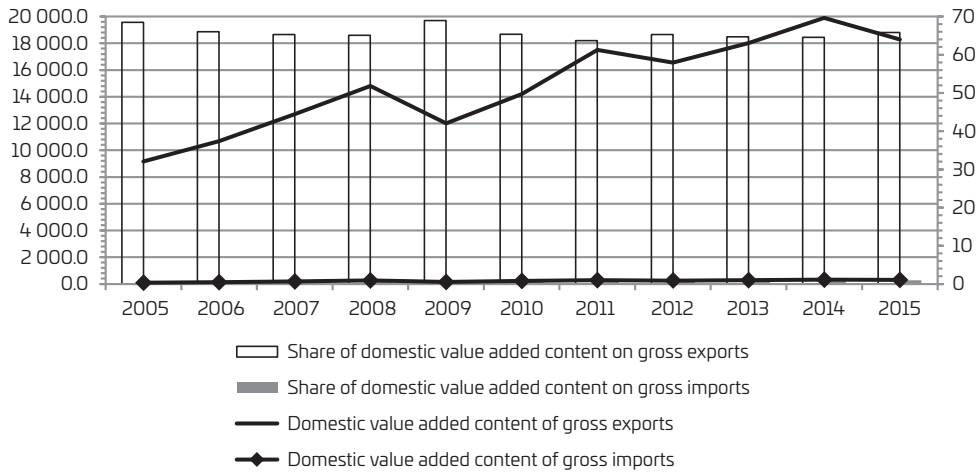
$29.568 billion in 2007 (OECD, 2019 m). In the same year, also the largest annual growth rate of 34.95% was recorded, whereas the minimum decrease of –31.26% was in 2009. But also this impressive array of volatile growth amplitudes was by far outpaced by the resulting balance of traded value added embodied in the final demand. It increased from $1.246 billion in 2005 by 81.32% to $2.258 billion in 2015 (OECD, 2019n). The annual growth rates ranged from extraordinary 942.78% in 2010 to –684.49% in 2007. So, the growth path was strongly distorted by the high sensitivity of balance to cyclical shifts of value added volumes in both trade directions. The maximum value of balance of $2.944 billion was recorded in 2013.

German-Polish trade in manufacturing

Manufacturing still reveals the largest contribution to the economic output development of Germany, so here we analyse also the value added development in trade between Germany and Poland for this economic sector and compare it with the overall German trade development. Gross exports increased from $13.368 billion in 2005 by 107.82% to $27.781 billion in 2015 (OECD, 2019o). And manufacturing export volumes grew much faster than the aggregated German-Polish trade (+13.77%-points) and the worldwide trade of German economy (+60.62%-points). The maximum export volume was recorded in 2014 with $30.811 billion. The annual growth rates varied from –23.40% in 2009 to 26.41% in 2011. In comparison with exports, gross imports from Poland developed slightly less dynamically with an increase from $15.321 billion in 2005 by 94.93% to $29.866 billion in 2015 (OECD, 2019p). This growth was at the same level as the German-Polish aggregated imports but nevertheless larger than that of German worldwide imports (+41.5%-points). The German-Polish gross imports from manufacturing recorded their maximum value of $35.000 billion in 2008. Their annual growth rates ranged from 36.47% in 2007 to –37.29% in 2009. The development of domestic value added content of gross exports in manufacturing did not reach the same dynamics as the export development (see Figure 4). It increased from $9.156 billion in 2005 by 99.69% to $18.282 billion in 2015, with a maximum value of $19.895 billion in 2014 (OECD, 2019q). Its annual growth rates varied from –18.88% in 2009 to +23.23% in 2011. The dynamics of value added in manufacturing exports was larger than in the aggregated German-Polish trade and German worldwide trade (+22.5 resp. 56.78 percentage points). Compared with this, domestic value added in manufacturing imports revealed an even more dynamic performance, however, on much lower absolute levels. They increased from $0.094 billion in 2005 by extraordinary 218.72% to $0.298 billion in 2015, with a maximum level of $0.319 billion in 2014 (OECD, 2019 r). Value added of manufacturing imports in comparison with worldwide German imports revealed an outstanding growth rate, which was about 175.37 percentage points larger, but in relation

to German-Polish imports still –6.18 percentage points smaller. So, the value added of the sector performed better in exports, compared with both benchmarks (global and bilateral), but in imports only, if the worldwide trade is considered. The share of domestic value added content in gross exports in manufacturing developed nearly horizontally between 2005 and 2015. It decreased slightly from 68.49% by –3.91% to 65.81%, with its maximum in 2009 of 68.94%, reflecting the parallel growth development of both exports volumes and value added. This is underlined also by a small interval of annual growth rates around zero point, with a maximum of 5.91% in 2009 and minimum of –5.22% in the following year. In comparison with it, the share of value added content in gross imports recorded a progressive development, however on small value levels. It increased from 0.61% in 2005 by 63.50% to 1.00% in 2015. The annual growth rates ranged from –7.60% in 2009 to 19.36% in 2010. In manufacturing exports the final shares of domestic value added couldn't reach that of aggregated German-Polish trade (–7.44%-points) nor of German worldwide trade (–13.02%-points). In imports, the manufacturing sector recorded in comparison with both benchmarks different results: slightly larger than in German-Polish trade (+0.15 pp) but smaller than the worldwide German trade (–2.06 pps).

Figure 5. Domestic value added content of gross exports and imports in manufacturing between Germany and Poland 2005–2015 [USD millions] (left axis), share of domestic value added content of gross exports and imports [%] (right axis)

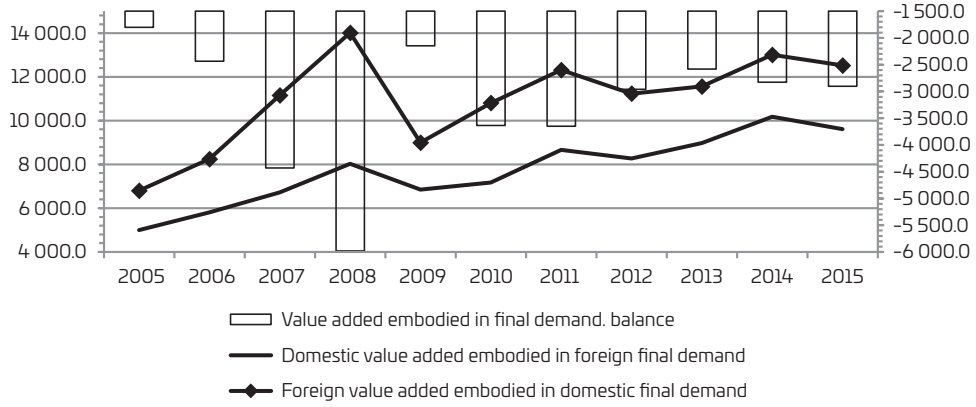


Source: author's material based on OECD (2019o), OECD (2019p), OECD (2019q) & OECD (2019r).

Also the domestic value added in manufacturing embodied in foreign final demand recorded an impressive growth development (see Figure 4). It increased from $4.997 billion in 2005 by 92.37% to $9.612 billion in 2015 (OECD, 2019s). The maximum value

of $10.178 billion was reached in 2014. The annual growth rates varied from –14.69% in 2009 to 20.89% in 2011. The foreign domestic value added in manufacturing embodied in domestic final demand developed consequently on larger levels in the analysed period than the domestic value added revealing the main characteristic distinct from all the indicators described above. It increased from $6.797 billion in 2005 by 84.16% to $12.518 billion in 2015 (OECD, 2019t). Its maximum value of $14.008 billion was recorded in 2008, the annual growth rates ranged in a huge interval from –35.77% in 2009 to 35.36% in 2007. Also, if its average growth rate was smaller than that of the domestic value added in foreign final demand, the foreign value added in domestic final demand exceeded the former by far with consequence of negative balances in the whole period. They decreased from $ –1.801 billion in 2005 by 61.35% to $ –2.905 billion in 2015 (OECD, 2019u). The minimum value of $ –4.430 billion was recorded in 2007. The annual growth rates varied from –64.07% in 2009 to 81.87% in 2007. In comparison to both benchmarks, the development of the domestic value added in foreign final demand in manufacturing performed better (+15.18 pps than the German-Polish trade and +47.48 pps than the worldwide trade of Germany).

Figure 6. Domestic/foreign value added in foreign/domestic final demand in trade in manufacturing between Germany and Poland 2005–2015 [USD millions] (left axis), balance of value added in final demand (right axis)



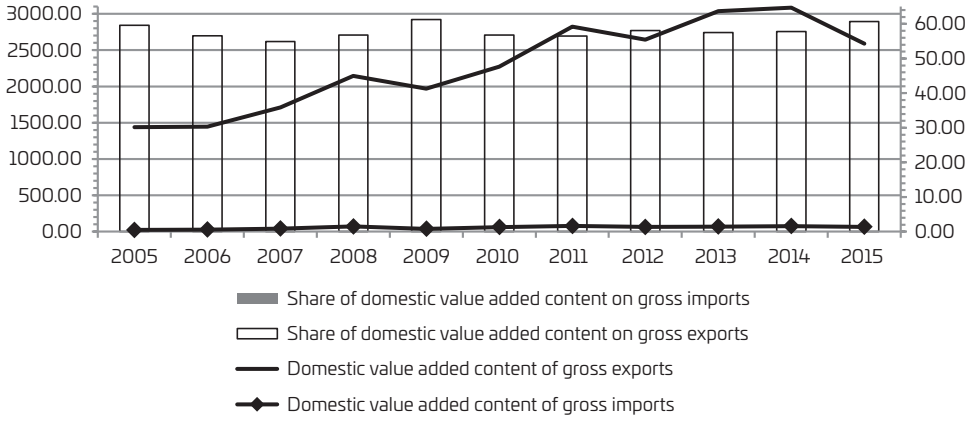
Source: author's material based on OECD (2019s), OECD (2019t) & OECD (2019u).

German-Polish trade in motor vehicles, trailers and semi-trailers

The major German industrial sector motor vehicles, trailers and semi-trailers usually reflect and determine the basic economic developments of Germany. Gross exports from Germany to Poland increased from $2.418 billion in 2015 by 76.55% to $4.269 billion

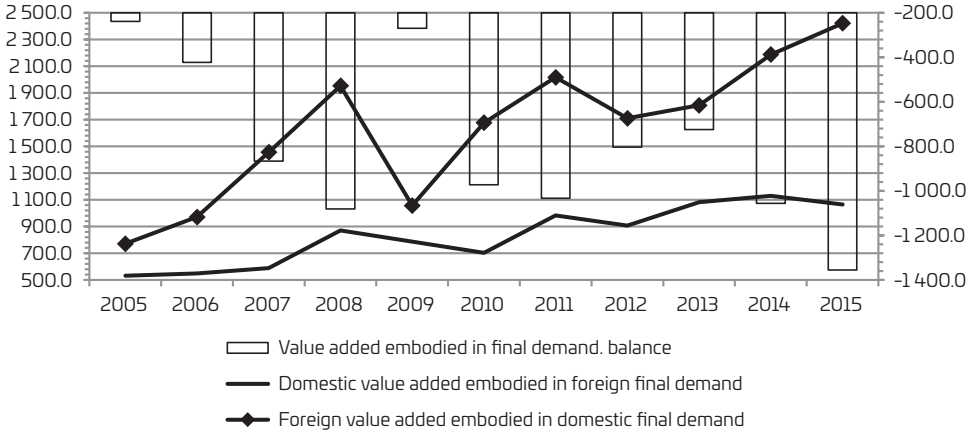
in 2015 (OECD, 2019v). The maximum value of exports was $5.340 billion in 2014. The annual growth rates ranged from 24.78% in 2011 to –20.06% in 2015, with the latter being generally an unfortunate year for German automobile producers. The sector exports developed more slowly than exports in the aggregated German-Polish trade (–17.5 pps) but faster than those of German global trade (+29.35 pps). Gross imports increased in the same period from $2.522 billion by as much as 109.77% to $5.291 billion, within a steadily negative sector balance in bilateral trade with Poland (OECD, 2019 w). The import maximum value was $6.545 billion in the year before the economic crisis of 2008. The annual growth rates in the analysed period varied between 48.25% in 2008 and –46.63% in the following year. Imports of the sector developed faster than those of German-Polish trade (+13.87 pps) as well as German global trade (+68.27 pps). The domestic value added content of gross exports increased from $1.440 billion in 2005 by 79.83% to $2.590 billion in 2015 (OECD, 2019x). And the domestic value added developed in the whole period nearly at same growth level as exports and reached its absolute maximum in 2014 with $3.087 billion (see Figure 5). The annual growth rates ranged from 25.54% in 2008 to –16.08% in 2015. The value added of sector exports developed slightly more slowly than those of the German-Polish trade (–6.89 pps) but faster than of those the German global trade (+36.92 pps). Compared to this, the domestic value added content of gross imports developed on a small level but with larger relative dynamics. It increased from $22.9 million in 2005 by 186.03% to $65.5 million in 2015 (OECD, 2019y). Annual growth rates varied from 66.90% in 2008 to –45.18% in the following year. So, the domestic value added of imports increased much faster than in the reverse direction of exports, but, however, on very small quantitative levels in comparison with exports. In comparison with both benchmarks, the value added content of imports developed more slowly than in the case of the German-Polish trade (–38.87 pps) but much faster than in the case of the German global trade (+142.68 pps). The share of domestic value added content in gross exports recorded a small growth of 1.86% in the whole period. It increased from 59.58% in 2005 to 60.68% in 2015, with its maximum of 61.29% in 2009. The annual growth rates ranged from 7.09%, in the crisis year of 2009, to –7.37% in the following year. Here, a phenomenon of value added development pattern is visible: The value added reacted in comparison with traded volumes perspective with a smaller sensitivity to crisis downturns (–8.29% value added vs –15.00% exports in 2009) but damped also the reverse recovery trends (15.41% value added vs 24.60% exports in 2010), so value added revealed more resistance to shock oscillations. From the import perspective, this pattern is due to the small quantitative shares level in the sector only to a limited extent observable. The share of domestic value added content in gross imports increased from 0.91% in 2005 by 36.35% to 1.24% in 2015, reaching its maximum of 1.29% in 2014, however marginal it may look. The annual growth rates ranged from 12.65% in 2010 to –4.12% in 2015.

Figure 7. Domestic value added content of gross exports and imports in motor vehicles, trailers and semi-trailers between Germany and Poland 2005–2015 [USD millions] (left axis), share of domestic value added content of gross exports and imports [%] (right axis)



Source: author's material based on OECD (2019v), OECD (2019w), OECD (2019x) & OECD (2019y).

Figure 8. Domestic/foreign value added in foreign/domestic final demand in trade in motor vehicles, trailers and semi-trailers between Germany and Poland 2005–2015 [USD millions] (left axis), balance of value added in final demand (right axis)



Source: author's material based on OECD (2019z), OECD (2019aa) & OECD (2019ab).

The domestic value added embodied in foreign final demand increased from $532.7 million in 2005 by 100.08% to $1,065.8 million in 2015, with a maximum value of $1,130.8 million

in 2014 (OECD, 2019z). The annual growth rates varied from 48.00% in 2008 to –10.62% in 2010 (see Figure 5.2). In comparison with this, foreign value added embodied on domestic final demand developed on larger levels in the analysed period. It increased from $ 771.6 million in 2005 by extraordinary 213.76% to $ 2,421.0 million in 2015 (OECD, 2019aa), with maximum of $ 2,186.7 million in 2014. The annual growth rates ranged from 58.61% in 2010 to –45.86% in 2009. The balance of value added in final demand was in the whole period negative in the sector, with a growing tendency. It decreased from $ –238.9 million in 2005 by 476.22% to $ –1,355.1 million in 2015 (OECD, 2019 ab). The annual growth rates ranged from –75.05% in 2009 to 260.7% in the following year. As described above, countercyclical effects are also visible in the value added on final demand: In the crisis year of 2009 foreign value added in domestic final demand decreased much more than domestic value added embodied in foreign final demand, so the balance improved from the perspective of Germany substantially, an effect, which is also seen in 2012.

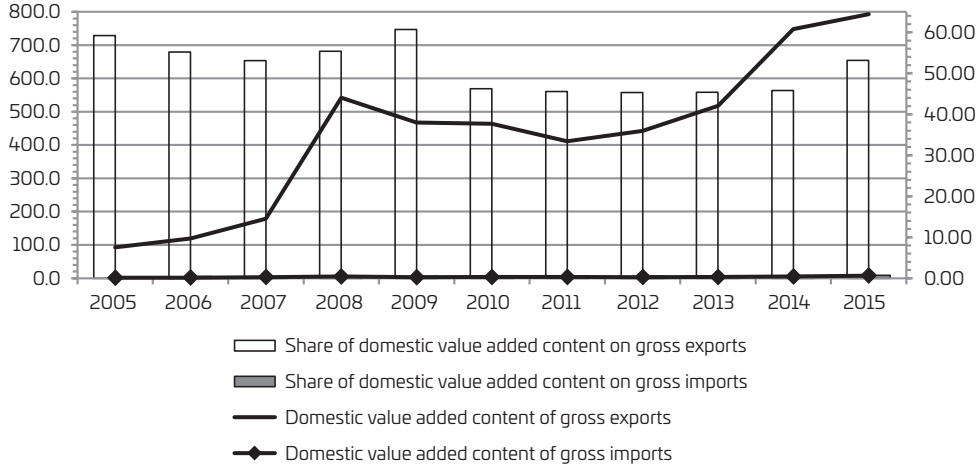
German-Polish trade in computer, electronic and optical products

In the digital transformation of society production, trade and usage of digital technologies belongs to key factors of present and future development. In the available OECD sector data, digital goods are not outlined explicitly but subsumed among computer, electronic and optical product so we analyse the sector behavior to derive conclusions for subcategory of digital technologies and later estimations for bilateral trade of digital goods. Gross exports of computer, electronic and optical products increased from $ 157.2 million in 2005 by extraordinary 849.36% to $ 1,492.4 million in 2015 (OECD, 2019ac). This was the largest growth dynamics in the German-Polish export developments. Compared with both benchmarks of the German global trade and bilateral trade, it was 802.16 respectively 755.31 pps larger, so the sector trade reflected also the increasing importance of digitalisation, also if it is the only part of it. The maximum of $ 1,632.7 million was recorded in 2014. The annual growth rates ranged from 190.03% in 2008 to –21.21% in the following year. Also gross imports increased by impressive rates. They increased from $ 422.8 million in 2005 by 161.78% to $ 1,106.8 million in 2015 (OECD, 2019ad). Until 2008, imports exceeded export volumes substantially, but beginning from 2009, the balance reversed, so the bilateral sector trade revealed finally a remarkable positive balance. The annual growth rates of imports ranged from 69.97% in 2007 to –42.77% in 2009. Compared with overall growth rates of the German-Polish trade or German global trade, the imports of the computer, electronic and optical products sectors developed above average: they recorded here a growth rate surplus of 65.88 pps and 120.28 pps respectively. If we look at the domestic value added content

of gross exports, the development dynamics is comparable with that of export volumes, however, on lower absolute quantitative levels. It increased from $93.1 million in 2005 by 751.66% to its final maximum level of $792.9 million in 2015 (OECD 2019, ae). The annual growth rates varied from 202.63% in 2008 to –13.68% in the following year, so from the export perspective, the traded volumes and value added content followed comparable growth trends (see Figure 6). Measured by the overall growth rate of the German-Polish or German global trade the value added content of exports increased faster than both benchmarks. They recorded a growth rate surplus of 664.94 pps and 708.75 pps respectively. From the import perspective, there is another pattern: the domestic value added content of gross imports increased in the relative perspective much faster than pure import volumes, but on very small absolute quantitative levels. It increased from $1.4 million in 2005 by 471.43% to $8.0 million in 2015 (OECD, 2019 af). The annual growth rates ranged from 78.95% in 2007 to –47.17% in 2009. The growth rate of added value content of gross imports was much larger than those of the German-Polish trade (+246.53 pps) and the German global trade (+428.08 pps). The share of domestic value added content on gross exports decreased due to smaller average growth rates of value added from 59.22% in 2005 by –10.29% to 53.13% in 2015. Its maximum value was 60.70% in the crisis year of 2009, where export volumes dropped faster than value added content (21.21% vs 13.68%) and its minimum was 45.30% in 2012. The annual growth rates ranged from 15.92% in 2015 to –23.83% in 2010 (in the latter constellation, a considerable positive growth rate of exports coincided with a slightly negative one of value added, marking a negative signal of value added shares of quite a twofold nature). The share of domestic value added content in gross imports increased from 0.33% in 2005 by 161.78% to 0.72% in 2015, reaching its maximum in the last year. The annual growth rates ranged from 22.53% in 2008 to –7.69% in the following year. Here, in 2009, value added decreased faster than import volumes so the share development is confirming the real recessionary movement of bilateral trade without distortions.

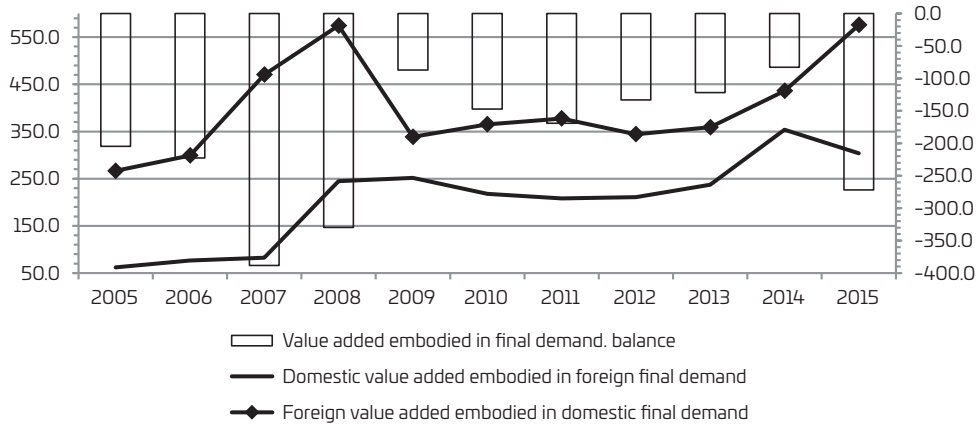
The domestic value added embodied in foreign final demand increased from $62.2 million in 2005 by extraordinary 388.59% to $303.9 million in 2015 (OECD, 2019 ag). The maximum value of $353.6 million was recorded in 2014 (see Figure 6). The annual growth rates varied from 197.33% in 2008 to –14.06% in 2015. The foreign value added embodied in domestic final demand increased from $266.7 million in 2005 by 115.9% to $575.8 million in 2015 (OECD, 2019 ah); so, despite higher absolute quantitative levels, relative dynamics was much smaller than that of domestic value added. The annual growth rates ranged from 57.34% in 2007 to –41.03% in 2009. The sector balance of value added was in the whole period negative: it decreased from $ –204.5 million in 2005 by 32.96% to $ –271.9 million in 2015 (OECD, 2019 ai). The minimum was recorded of $ –388.3 million in 2007, whereas the maximum of $ –82.6 million was reached in 2014. The annual growth rates ranged from 229.18% in 2015 to –73.58% in 2009.

Figure 9. Domestic value added content of gross exports and imports in computer, electronic and optical products between Germany and Poland 2005–2015 [USD millions] (left axis), share of domestic value added content of gross exports and imports [%] (right axis)



Source: author's material based on OECD (2019ac), OECD (2019ad), OECD (2019ae) & OECD (2019af).

Figure 10. Domestic/foreign value added in foreign/domestic final demand in trade in computer, electronic and optical products between Germany and Poland 2005–2015 [USD millions] (left axis), balance of value added in final demand (right axis)



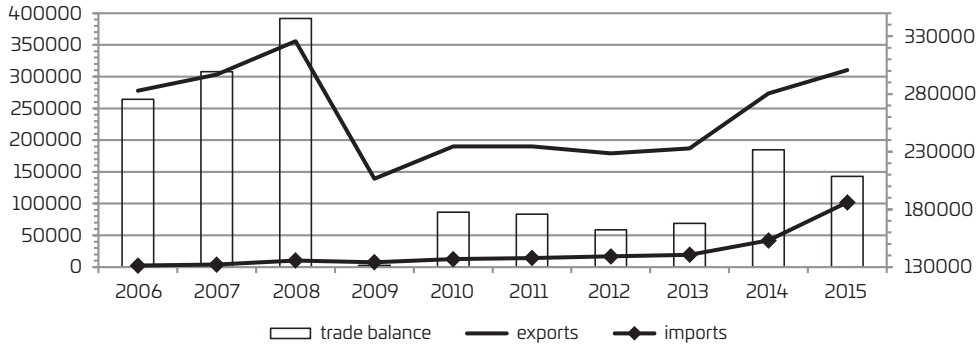
Source: author's material based on OECD (2019ag), OECD (2019ah) & OECD (2019ai).

German-Polish trade in digital products

The applied OECD database does not provide data for bilateral trade in digital products between Germany and Poland. Therefore, we combine results from the OECD sector data of computer, electronic and optical products with data from the German Statistical Office Destatis to draw conclusions with regard to the bilateral value added trade in digital products. For this purpose, we use an 8-digit goods classification to select digital technology traded between both economies and find 66 product categories (WA85422101 – WA85437006, see appendix for a specific classification), containing digital technology as their major contents embodied in the period 2006–2015 (for 2005 no data are available). Exports in digital products increased from $277.7 million in 2006 by moderate 11.75% to $310.3 million in 2015 (Destatis, 2019). The maximum value of $355.8 million was reached in 2008, the minimum of $139.1 million in the following year (see Figure 7). The annual growth rates ranged from 46.20% in 2014 to –60.91% in 2009. The export growth rates in digital goods revealed a large volatility with a considerable variance of 693.55. In comparison with benchmarks of the aggregated German-Polish trade and German global trade, the exports of digital products developed far below average. Its overall growth rate was 82.30 pps smaller than those of the former and still 35.45 pps smaller than the latter. According to this, exports of digital products contributed from quantitative perspective only to a small degree to improvement of trade patterns in support of the digitalisation processes. Imports of digital goods recorded also an increasing trend, however, on significantly smaller absolute levels but with a much stronger relative dynamics. They increased from $2.3 million in 2005 by extraordinary 4,236.49% to $101.7 million in 2015. The annual growth rates ranged from 172.35% in 2008 to –27.45% in the following year. With this large volatility, the variance of growth rates was with 3,594.04 even higher than that of exports. In contrast to the export side, imports of digital products from Poland revealed an extraordinary growth rate, also if compared with benchmarks of the German-Polish trade or German global trade. It recorded a growth surplus of 4,140.59 pps in relation to the former and 4,194.99 pps in relation to the latter. However, exports and imports of digital products recorded very asymmetric developments, based on marginal initial levels of imports. So, digital imports improved the technology position of bilateral trade but are still on quite low levels. The resulting trade balance in digital products was for the whole period positive. However, after the 2009 crisis, a seriously shrinking level was recorded. So, the trade balance decreased from $275.4 million in 2005 by –24.24% to $208.6 million in 2015. It reached its maximum of $345.4 million in 2008 and minimum of $131.5 million in the following year. The annual growth rates ranged from 38.03% in 2014 to –61.92% in 2009. The balance volatility revealed the vari-

ance of 656.17, which is comparable with exports, which is determined by the quantitative dominance of exports in digital trade.

Figure 11. Exports and imports of trade in digital products between Germany and Poland 2006–2015 [USD thousands] (left axis), trade balance (right axis)

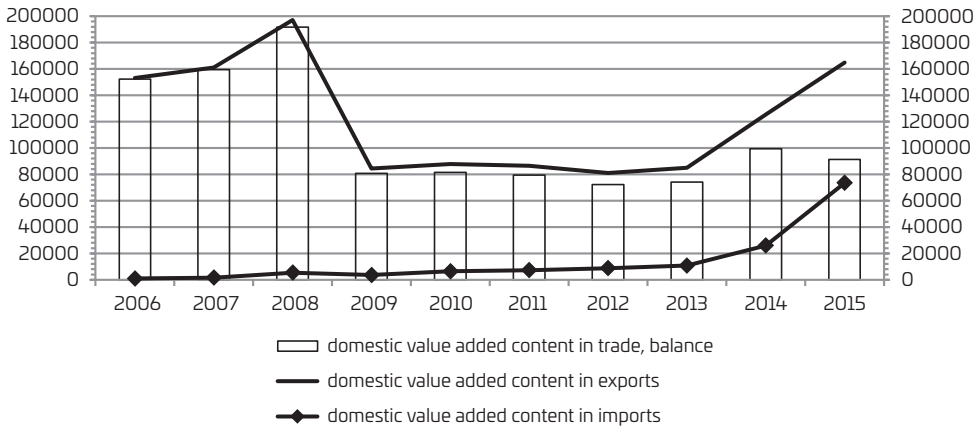


Source: author's material based on Destatis (2019).

The domestic value added content of exports and imports is in this analysis estimated under the assumption of equal value added shares in digital trade as measured above in the superordinate sector of computer, electronic and optical products, of which digital technologies are an essential part. So, as a consequence of no detailed data of the value added of digital products, we estimate their traded value added as if the value added shares of exports and imports developed in the same way as within the superordinate sector. According to this, the domestic value added of gross exports increased from $153.2 million in 2006 by 7.62% to $164.9 million in 2015 (see Figure 7). It reached its maximum of $197.1 million in 2008; its minimum of $81.0 million was in 2012. The annual growth rates of value added ranged from 47.62% in 2014 to –57.18% in 2009. Compared with both benchmarks of the German-Polish trade and German global trade, the domestic value added content of exports of digital products contributed (as for pure trade volumes) only to a small degree to improvement of trade patterns in terms of fostering digitalisation processes. Its overall growth rate was 79.1 pps smaller than in the value added in German-Polish trade and 35.29 pps smaller than in the value added in German global trade. In comparison with it, the domestic value added of gross imports developed on low level but with large dynamics. It increased from its minimum of $0.921 million in 2006 by 7,877% to its maximum of $73.5 million in 2015. The annual growth rates ranged from extraordinarily large 233.71% in 2009 to –33.02% in the following year. The overall growth of domestic value added content of gross imports of digital products was also impressive in comparison with the German-Polish or German global trade: It recorded a surplus of 7,652.1 pps to the former and

of 7,833.65 pps to the latter one. So, the value added of imports improved the position of German trade in support of digitalisation processes, however only on a small quantitative basis. The balance of domestic value added content decreased from $152.3 million in 2006 by –40.0% to $91.3 million in 2015. The maximum value of $191.8 million was reached in 2008, the minimum of $72.3 million in 2012. The annual growth rates ranged from 34.1% in 2014 to –57.85% in 2009.

Figure 12. Estimated domestic value added content of gross exports and imports in trade in digital products between Germany and Poland 2006–2015 [USD thousands] (left axis), balance (right axis)



Source: author's material based on Destatis (2019).

Summary and conclusions

The results of analysis showed a considerable positive development in the *German-Polish trade* in terms of value added between 2005 and 2015, which holds also true for the trade of digital products. However, in terms of domestic value added shares the German-Polish trade, which functions in our analysis as a second benchmark, revealed in 2015 only values below those of the German global trade level (see Table 1). In the German-Polish gross exports only 73.25% of content represented domestic value added (79.01% in the German global trade). In gross imports, the pattern is same but on quite a marginal level; here, only 0.85% was domestic value added in comparison with 3.06% in the global trade. So, the German-Polish trade contributed only to a smaller degree to the value added share development in an absolute perspective than it was in the case of global trade. In our analysis, the results of the German-Polish trade are used, beside those of the German global trade,

as the second benchmark for performance comparisons. In the *manufacturing sector,* the domestic value added share of gross exports of 65.81% was even lower than in the aggregated German-Polish trade; so here in manufacturing, the value added share development was less dynamic than in the latter. In imports, the value added share was in contrast to this larger value, so we observed here a better development than in the German-Polish trade. If we look at the industrial sectors, the German key *sector motor vehicles and others* recorded larger value added shares by 60.68% (in exports) and 1.24% (in imports) than other analysed sectors but revealed a smaller value in exports than in overall manufacturing, so the value added performance was below the industrial average. In contrast to this, in imports the value added share was by 1.24% larger than in manufacturing and also in the German-Polish trade. The *sector of computer, electronic and optical products* recorded the value added shares 53.13% in exports and only 0.72% in imports below manufacturing levels but also below both benchmarks of the German-Polish and German global trade. The conclusion of an only subaverage contribution of this key digitalisation sector to the value added share trade in the German-Polish trade.

Table 1. Synopsis of value added shares in 2015 and distance to benchmark I and II

Value added shares [%] & (distance to benchmark I / II [%-points])	Domestic value added content in gross exports	Domestic value added content in gross imports
German global trade (Benchmark I)	79.01 (0 / +5.76)	3.06 (0 / +2.21)
German-Polish trade (Benchmark II)	73.25 (–5.76 / 0)	0.85 (–2.21 / 0)
German-Polish trade: Manufacturing	65.81 (–13.2 / –7.44)	1.00 (–2.06 / +0.15)
German-Polish trade: Motor vehicles etc.	60.68 (–18.33 / –12.57)	1.24 (–1.82 / +0.39)
German-Polish trade: Computer etc.	53.13 (–25.88 / –20.12)	0.72 (–2.34 / –0.13)
German-Polish trade: Digital products	53.13* (–25.88 / –20.12)	0.72* (–2.34 / –0.13)

* assuming the equal value added shares in trade to the computer sector, etc.

Source: author's own calculations.

If the first analysis, results refer to the perspective of absolute (static) value added shares in trade, the relative growth rate perspective with a focus on dynamic development revealed another view. According to this, the *German-Polish trade* developed between 2005 and 2015 substantially faster than the German global trade (see Table 2); so, the visible smaller shares in value added increased much faster than in the global reference case but also pure trade volumes of exports (94.05%) and imports (95.9%) recorded larger overall growth rates. Here, especially the value added of gross imports recorded an exceptional dynamics (224.9%) and

a huge lead to the first benchmark of the German global trade (+181.55 pps). But also the value added of gross exports (86.72%) as well as the domestic value added content in foreign final demand (77.19%) and the foreign value added content in domestic final demand (76.82%) reached larger levels than those of the German global trade. In the *manufacturing sector* growth rates were even on larger levels than in the German-Polish trade, except for those in imports, where trade volumes increased by comparable 94.93% and value added content grew still by extraordinary 218.72%. Gross exports increased by 107.82%, whereas the value added content of gross exports grew by 99.69%, the domestic value added of foreign final demand by 92.37% and foreign value added of domestic final demand by 84.16%. So, manufacturing contributed above average to the growth development in both aspects, in value added as well as in trade volumes. In the German industrial key *sector of motor vehicles and others,* we received a mixed view of performance. Gross exports increased by 76.55% faster than in the German global trade but more slowly than in the German-Polish trade and in manufacturing. Gross imports performed with a growth rate of 109.77% better than both benchmarks but still remained behind the manufacturing sector development. The value added content of gross exports and imports increased by 79.83% and 186.03% faster than in the German global trade (benchmark I) but more slowly than the German-Polish trade (benchmark II). So, the sector's value added performance contributed only below the bilateral trade level to the overall development. The domestic value added content of foreign final demand and the reverse side of foreign value added content of domestic final demand increased by 108.08% and 213.76%, much faster than both benchmarks and outperformed also the results of manufacturing. In terms of the value added content of final demand, we observed an outstanding positive development, especially that of foreign value added of domestic final demand, which received the largest growth rate of analysed trade levels in our data set. *Trade in computer, electronic and optical products* performed without exception on the highest growth levels at rates far beyond both benchmarks and manufacturing results. Trade volumes increased exceptionally especially in gross exports by 849.36%, (largest export growth rate in the analysis), but also in gross imports the growth of 161.78% was very fast. The value added content of gross exports and imports increased respectively by 751.66% (the largest exports value added growth rate in analysis) and 471.43% in an outstanding way. If we focus on the value added content of final demand, the sector recorded with the largest growth rate of 388.59% of all trade levels in terms of domestic value added content of foreign final demand. At the reverse side of foreign value added content of domestic final demand, the growth revealed with a rate of 115.90% the second largest value of all trade levels behind those of the sector of motor vehicles. The high-tech associated sector contributed in all growth dimensions in an outstanding form to the overall development of the German-Polish trade. In our estimations of *trade in digital products,* we received a very mixed view in analysis. Gross exports increased by a rate of 11.75% far, below both benchmarks,

whereas gross imports developed on highest growth levels (4,236.49%), which made digital products "leaders in import growth" in the bilateral trade. Also the value added content of gross exports increased by 7.62%, only below average. Exports of digital products contributed in terms of both dimensions (trade volumes and value added content) only to a small degree to the development of bilateral trade. In contrast to this, the value added of gross imports increased by outstanding 7,788.00% (maximum value of this category). The trade in digital products enhanced and promoted the bilateral trade between Germany and Poland in terms of the growth perspective only on the import side, but here still on lower absolute quantitative levels. Also, if gross imports reached in 2015 only 32.77% of export volumes, their growth was impressive. In terms of the value added content, the imports reached just a level of 44.57% of the export value in 2015, so their outstanding growth rate underlines a remarkable dynamic processes in imports. However, the trade in digital products is, despite its import dynamics, only of marginal quantitative importance for the German-Polish trade in the absolute perspective. In 2015, they constituted a share of 0.69% of the aggregated German-Polish gross exports and 0.26% of gross imports. The value added content of gross exports of digital products included only 0.50% of bilateral traded value added of gross exports, so the product group of digital technologies had (still) a marginal relevance and fulfils only a subordinated function in promoting technological progress in the trade between Germany and Poland.

Table 2. Synopsis of overall growth rates in 2005–2015 and distance to benchmark I and II

Growth rate [%] & (distance to benchmark I / II [%-points])	Gross exports	Gross imports	Value added content of gross exports	Value added content of gross imports	Domestic value added content of foreign final demand	Foreign value added content of domestic final demand
German global trade (Benchmark I)	47.2 (0 / –46.85)	41.5 (0 / –54.4)	42.91 (0 / –43.81)	43.35 (0 / –181.55)	44.89 (0 / –32.30)	34.24 (0 / –42.58)
German-Polish trade (Benchmark II)	94.05 (+46.85 / 0)	95.9 (+54.4 / 0)	86.72 (+43.81 / 0)	224.9 (+181.55 / 0)	77.19 (+32.21/ 0)	76.82 (+32.21 / 0)
German-Polish trade: Manufacturing	107.82 (+60.62 / +13.77)	94.93 (+53.43 / –0.97)	99.69 (+56.68 / +12.97)	218.72 (+175.37 / –6.18)	92.37 (+47.48 / +14.55)	84.16 (+49.92 / +7.34)
German-Polish trade: Motor vehicles etc.	76.55 (+29.35 / –17.5)	109.77 (+68.27 / +13.87)	79.83 (+36.92 / –6.89)	186.03 (+142.68 / –38.87)	108.08 (+63.19 / +30.26)	213.76 (+179.52 / +136.94)
German-Polish trade: Computer etc.	849.36 (+802.16 / +755.31)	161.78 (+120.28 / +65.88)	751.66 (+708.75 / +664.94)	471.43 (+428.08 / +246.53)	388.59 (+34.37 / +310.77)	115.9 (+81.66 / +39.08)
German-Polish trade: Digital products	11.75 (–35.45 / –82.3)	4236.49 (+4194.99 / +4140.59)	7.62 (–35.29 / –79.1)	7877 (+7833.65 / +7652.1)	–*	–*

* on trade of Digital products no data available

Source: author's own calculations.

The German-Polish-trade developed between 2005 and 2015 with large dynamics and showed striking improvements of trade pattern in trade volumes as well as also in traded value added content. Primarily it was the manufacturing sector that contributed to it, especially the automotive sector, but we found the largest contribution in the sector of computers and electronic and optical products. The bilateral trade in digital products was only of marginal quantitative relevance and contributed only on the side of import developments to the promising improvements of the overall German-Polish trade.

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Appendix: German trade statistics classification (8 digits) – excerpt of categories containing major parts of digital technologies, according Destatis (2019)

WA85422101	Integ. Schaltungen, Wafers, MOS-Technik (b.2006) St
WA85422105	Integ. Schaltungen, Chips, MOS-Technik (b.2006) St
WA85422111	Dyn. Schreib-Lesespeicher bis 4Mbit (b.2006) St
WA85422113	Dyn. Schreib-Lesespeicher von 4-16Mbit (b.2006) St
WA85422115	Dyn. Schreib-Lesespeicher von 16-64Mbit (b.2006) St
WA85422117	Dyn. Schreib-Lesespeicher über 64Mbit (b.2006) St
WA85422120	Stat. Schreib-Lesespeicher, Cache-RAMs (b.2006) St
WA85422125	UV-löschbare, programmierb.Lesespeicher (b.2006) St
WA85422131	Programmierbare Lesespeicher bis 4MBit (b.2006) St
WA85422133	Programmierbare Lesespeicher 4-16MBit (b.2006) St
WA85422135	Programmierbare Lesespeicher 16-32MBit (b.2006) St
WA85422137	Programmierbare Lesespeicher >32MBit (b.2006) St
WA85422139	Andere Programmierbare Lesespeicher (b.2006) St
WA85422141	Andere Speicher (b.2006)
WA85422145	Digitale Mikroprozessoren (b.2006) St
WA85422150	Digitale Mikrocontroller, Mikrocomputer (b.2006) St
WA85422161	Digitale Mikroperiphere Einheiten (b.2006) St
WA85422169	Andere digitale Metalloxidhalbleiter (b.2006) St
WA85422171	Integrierte Schaltungen, Wafers (b.2006) St
WA85422173	Integrierte Schaltungen, Chips (b.2006) St
WA85422181	Andere Speicher (b.2006)
WA85422183	Mikroprozessoren (b.2006) St
WA85422185	Mikrocontroller und Mikrocomputer (b.2006) St
WA85422191	Mikroperiphere Einheiten (b.2006)
WA85422199	Andere Schaltungen (b.2006) St
WA85422910	Integr.Schaltungen,Wafers (b.2006) St
WA85422920	Integr.Schaltungen,Chips (b.2006) St
WA85422930	Verstärker (b.2006)
WA85422950	Leistungsregler und Spannungsregler (b.2006)
WA85422960	Steuerbausteine und Kontrollbausteine (b.2006)
WA85422970	Schnittstellenbausteine (b.2006)
WA85422990	Andere Schaltungen (b.2006) St
WA85423110	Prozessoren, Kontrollschaltung, Multichip (b.2016)

WA85423111	Prozessoren, integrierte Multichipschaltungen MCOs
WA85423119	Prozessoren laut Anmerkung 9b, a.n.g.
WA85423190	Prozessoren und Steuer-,Kontrollschaltungen
WA85423210	Speicher für integrierte Multichipschalt. (b.2016)
WA85423211	Speicher für integrierte Multichipschaltungen MCOs
WA85423219	Speicher laut Anmerkung 9b, a.n.g.
WA85423231	Dynamische Schreib-Lesespeicher <512 Mbit St
WA85423239	Dynamische Schreib-Lesespeicher >512 Mbit St
WA85423245	Statische Schreib-Lesespeicher, Cache-RAMs St
WA85423255	UV-löschbare, programmierbare Lesespeicher St
WA85423261	Flash E2PROMS <512 Mbit St
WA85423269	Flash E2PROMS >512 Mbit St
WA85423275	Andere Programmierbare Lesespeicher St
WA85423290	Speicher in Form von Mehrfachkombinationen
WA85423300	Verstärker, elektr.integrierte Schaltungen (b.2016)
WA85423310	Verstärker, integrierte Multichipschaltungen MCOs
WA85423390	Verstärker, elektr.integrierte Schaltungen, a.n.g.
WA85423910	Integrierte Multichipschaltungen (bis 2016)
WA85423911	Integrierte Multichipschaltungen MCOs, a.n.g.
WA85423919	Integrierte Schaltungen laut Anmerkung 9b, a.n.g.
WA85423990	Schaltungen, elektronisch, integriert
WA85426000	Hybride integrierte Schaltungen (b.2006)
WA85427000	Mikrobausteine, elektr.Mikroschaltungen (b.2006)
WA85429000	Teile von elektronischen integrierten Schaltungen
WA85431000	Teilchenbeschleuniger
WA85431100	Ionenimplantationsanlagen zum Dotieren (b.2006)
WA85431900	Teilchenbeschleuniger (b.2006)
WA85432000	Signalgeneratoren
WA85437002	Mikrowellenverstärker
WA85437003	Infrarotfernbedienung für Videospielkonsolen
WA85437004	Flugdatenschreiber, digital
WA85437005	Lesegeräte, tragbar, Textdateien, Audiodateien
WA85437006	Signalverarbeitungsapparate, digital

6 German-Polish Trade after 2004. German FDI in Poland. Polish FDI in Germany. A Comparative Analysis

Katarzyna Kamińska

Introduction

Foreign direct investment (FDI) is nowadays considered to be the most beneficial and safe form of international capital flows and a form of financing restructuring and development processes. When a favourable organisation is combined with a structural system of factors, they become the most effective way of obtaining direct access to modern techniques and technologies in the sphere of production and management, as well as foreign markets. In order to support the economic development of a country, it is not really necessary to take into account the size of a foreign investment but its quality and to answer the question whether it increases the country's ability to create innovation, and to create new jobs in the long term (Rybiński, 2007, p. 21). Foreign direct investment can be classified as a special form of international capital trade. As a result, not only monetary funds but also specific investment goods are transferred, which is why these are property investments. Another special feature is the assistance in establishing regular international contacts between the exchange countries. In countries undergoing a political transformation, including Poland, there is a constant need to modernise the economy. Foreign direct investment is a device that significantly impacts this process (Janasz, 2011, p. 35).

There is still no consensus among researchers dealing with the phenomena of foreign trade and foreign direct investment in the 20th century as to whether there is complementarity

or substitutability between the two processes[1]. Studies in this area in the 1990 s on the relationship between German direct investment and goods exports showed that FDI and goods exports can complement each other and, in some cases contribute to the mutual growth. Labour-intensive industries, such as the car industry, occupy a special place here, clothing or textiles for which export substitution has been observed goods are a form of export of capital (Stępniak, 1996, pp. 233–242). The Polish-German economic relations are an extremely interesting research field in this respect. Poland, as the largest market among the new EU member states and the second-largest neighbour of Germany after France, occupies a key position in Central and Eastern Europe. Even before Poland's accession to the European Union in 2004, the trade between Poland and Germany was developing very dynamically over the years. German-Polish economic relations are characterised by intensity and asymmetry. Bilateral FDIs are very important for both countries in their development. In Poland, German companies took part in the privatisation of the Polish economy, have a positive impact on employment growth and productivity, improve technological skills of Polish companies and increase the growth potential of the Polish economy. Germany plays an important role in linking Poland to the global value chains. It is the largest foreign supplier of semi-finished products and services for Polish exports, as well as the largest foreign exporter of Polish added value in the form of semi-finished products and services included in German exports of goods. For the German side, investing in Poland means seeking new markets and making return on the capital invested.

Nevertheless, it is worth noting that many studies on the inflow of German FDI have appeared in the literature on the subject, while relatively few of the published studies have been devoted to Polish investments in Germany[2]. As regards the role of Polish FDI in the German economy, its importance has been growing in recent years. Particularly noteworthy is the growing number of acquisitions of German companies by Polish entities, which very often saves German companies from bankruptcy.

The aim of the article is to compare the German-Polish trade and the German FDI in Poland and the Polish FDI in Germany from the accession of Poland to the EU in 2004 to 2017[3].

The analysis focuses on the identification of the main trends in the German-Polish trade and its structure, similarities and differences between motives and directions of investment activities, and their importance for the economic development of both countries. The research method used in this article is a qualitative comparative analysis.

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1 Such research was carried out, for example by J. Stehn, W. Gruber, D. Mehta, R. Vernon, T. Horst, B.M. Wolf, K. Kojima and T. Ozawa.

2 An example of this kind of analysis is found in Sońta-Drączkowska, 2014, pp. 431–452 and Bogdańska-Czyrnek D., 2014, pp. 411–428.

3 At the time of the preparation of the article, some relevant statistics for 2018 were not yet available.

1. Contemporary trends in the Polish-German economic cooperation

Germany has been Poland's main trading partner since 1990 and was previously a major trading partner in the interwar period. After World War II, Poland's second trading partner until the 1970s was East Germany, followed by Germany. Since 2004, Poland's trade with Germany has been steadily growing (Figure 1).

Figure 1. Poland's trade with Germany in the years 2004–2017 in USD billions

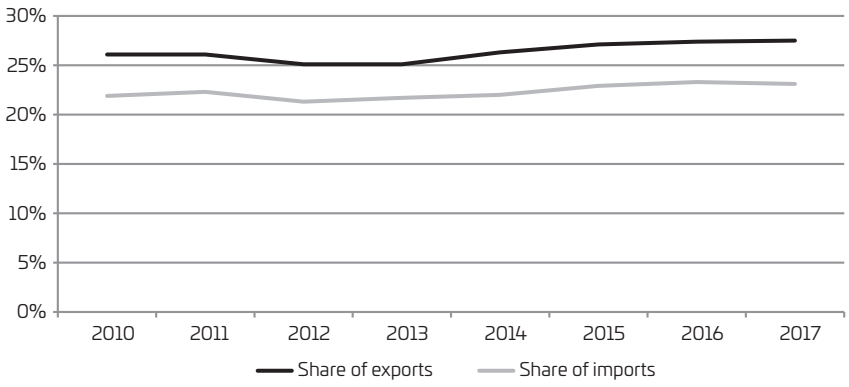
Source: author's material based on the GUS data.

On the other hand, the share of exports to Germany and imports from Germany in Poland's trade turnover generally shows slight fluctuations throughout the period – the share of exports to Germany in total exports was between 25–28%, while the share of imports was 21–24% (Figure 2) (Kamińska, Kulińska-Sadłocha, 2019, pp. 200–201). The structure of Polish exports to Germany is currently very well diversified. It is estimated that none of the sectors currently takes more than 12% (Bittorf, 2020). The exports include mainly processed goods, such as: motor vehicles with accessories, mechanical products and a significant amount of furniture and household equipment, as well as high quality food products. German imports from Poland have recently been dominated by motor vehicles and parts with a share of 13.6%, machinery with a share of 9.9% and food with a share of 9.3% (Bittorf, 2020).

In 2018, Germany's share in total Polish exports exceeded 28%, which means that Poland is becoming an increasingly important trading partner for Germany in Central and Eastern Europe. Poland is ranked eighth in the German foreign trade statistics for 2018 (*Statistisches Bundesamt*, 2019, p. 2). German exports are dominated by vehicles and their equipment,

machines and devices, electrical engineering and chemical products. Poland exports mainly vehicle parts and equipment, food products, furniture and household appliances.

Figure 2. The share of trade with Germany in the trade turnover of Poland in the years 2004–2017



Source: author's material based on the GUS data.

The Polish-German trade is characterised by a high degree of intensity. On the one hand, the factors affecting it are internal conditions and, on the other hand, the investments carried out by German companies in Poland. If we take into account individual sectors of the economy, we can state that foreign investments and their nature can create a foreign trade model. The links also play a key role in trading within global, corporate supply chains. It is therefore very important to understand well trade patterns and the relationship between the suppliers and customers (Czernicki, Czerwiński, Gurbiel, Popławski, 2019, p. 48)

The analysis carried out by the Jagiellonian Club shows that the relations between Poland and Germany are essentially characterised by the following trade patterns (Czernicki, Czerwiński, Gurbiel, Popławski, 2019, p. 49):

- commercial transactions where the final consumer is the Polish or German consumer (a natural person or business). The main factor creating demand is the demand of the local market. Typical products in this commercial model include food products, building materials or household appliances;
- commercial transactions where the final recipient is a consumer (an individual or company) outside Poland or Germany. In this case, the factor creating demand is the request of the foreign market. An illustration of a supply chain may include the production of components in Poland with the final assembly in Germany followed by the export of the finished product to a third country;

- commercial transactions, including ancillary services – a characteristic feature is, in this case, to increase the exporter's added value by providing them with ancillary services directly linked to the exported product;
- the graduation of the added value of commercial transactions – this model is connected with those as mentioned earlier; its essence is the evolution of the advanced of technological trade (e.g. automotive or aircraft industry, for which a certain generalisation can be defined supplier categories according to technological competence);
- B2B vs B2C – from the perspective of entering the export market, the key factors are the understanding of the mechanisms governing the distribution channels, which in certain cases may constitute a significant barrier to trade (e.g. the sale of consumer products through large retail chains).

An important issue in the undertaken considerations is the problem of the need for control of their supply chains by manufacturers, which is evidenced by the development of foreign investments and the establishment of branches or subsidiaries by foreign companies in the country. As mentioned before, the development of foreign investments affects trade relations and has an impact on increasing the competitiveness of the economy. It should also be noted, however, that although foreign investments have a decisive competitive advantage over companies with domestic capital, they may take over their market share. As a consequence, it may lead to a gradual reduction in the potential for building up and accumulating domestic capital.

When considering the issues of economic cooperation between Germany and Poland, it should be noted that the Polish economy is much more dependent on enterprises with foreign capital than the German economy. This results in a situation where domestic companies have to be much more involved in supply chains beyond the control of domestic capital, but a relatively high level of innovation in German companies investing in Poland makes it necessary for Polish companies to improve their technological skills (Czernicki, Czerwiński, Gurbiel, Popławski, 2019, p. 50).

2. Development of the German FDI in Poland

A significant increase in FDI in Poland was recorded in 1992, when the first effects of the economic transformation appeared in Poland, and the general economic situation improved. An increasingly stable political situation, as well as a economic and social situation, the adopted legal solutions and Poland's market potential offering a large market and cheap labour force became factors attracting German investors (Bogdańska-Czyrnek, 2014, p. 415). The significance of various incentives created by the Polish government, including tax exemptions, is worth mentioning at this point (Romiszewska, 2000, pp. 426–427).

All the above factors contributed to the inflow of German capital in the form of FDI to a varying degree and caused the intensification of Polish-German economic relations. Interestingly, the German economic system was an inspiration for the architects of Polish economic reforms. Thus, the model of the social market economy in Article 20 of the Polish Basic Law of 1997 was recognised as a model on which the future economic system of Poland was to be based.

In terms of the number and value of foreign direct investments in Poland, German companies occupy a leading position. The value of German direct investments in Poland since the system transformation in 1989/1990 amounts to approximately EUR 35 billion[4]. One of the reasons for locating German investments in Poland is the development dynamics of the Polish economy. Numerous foreign direct investment (FDI) transactions from Germany play a significant role in modernisation and increase export dynamics in Poland, while German FDI flows into high value-added manufacturing Polish industries (especially the automotive industry) and into the financial and insurance sectors (Bittorf, 2020). According to the National Bank of Poland, the value of foreign direct investment liabilities in Poland at the end of 2018 was EUR 199.7 billion. The highest stock of foreign direct investment liabilities at the end of 2018 was recorded towards investors from the Netherlands (EUR 42.6 billion), and Germany was in second place – EUR 34.8 billion. Taking into account the sectoral breakdown, the largest amounts of liabilities in 2018 were in industrial processing (EUR 62.6 billion), financial and insurance activities (EUR 37 billion), wholesale and retail trade including vehicle repair (EUR 29.1 billion) and real estate activities (EUR 19.2 billion). In contrast, the amount of EUR 13.4bn was the share in professional, scientific and technical activities related to expenses (NBP, 2019).

Germany has supported the process of advancement in Poland in various modes. Within the European Union, of which Poland has been a member since 2004, Germany, as the largest net contributor, has been making an important contribution to Poland's economic development. Germany has also supported Poland through programmes of the World Bank, the European Bank for Reconstruction and Development and the International Monetary Fund[5].

A fundamental change in the amount of the German FDI inflow to Poland should be noted when Poland joined the European Union and gained access to significant support funds (Figure 3).

As presented in Figure 3, 2005 saw a significant increase in FDI inflow of EUR 12.63 bn to Poland from Germany, compared to 2004; in the following years, this increase was even more conspicuous. The German FDI grew gradually and in 2017 reached the level of over

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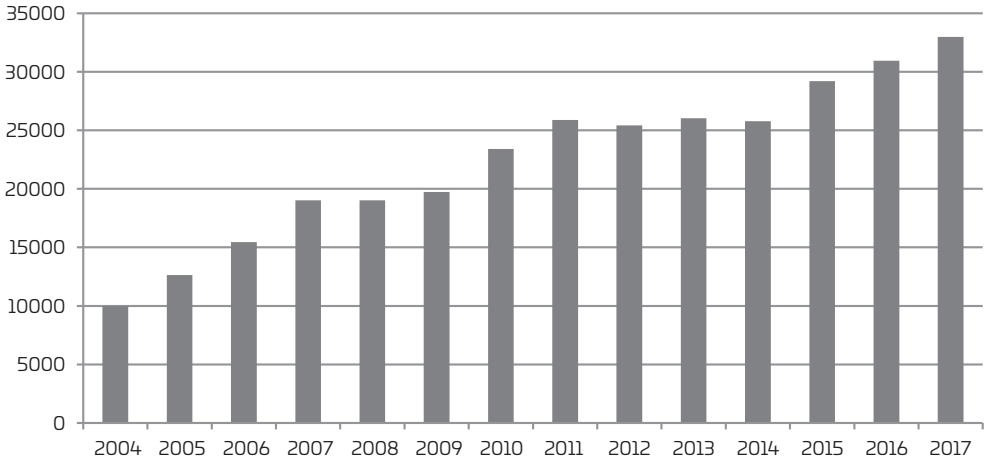
4 The calculations are based on: https://polen.diplo.de/pl-pl/02-themen/02–3-wirtschaft/03-dt-poln-wirtschaftsbeziehungen (access date 13/11/2019).

5 See more: https://polen.diplo.de/pl-pl/02-themen/02–3-wirtschaft/03-dt-poln-wirtschaftsbeziehungen (access date 13/11/2019).

EUR 32.9 bn, which made Germany the second biggest foreign investor in Poland, outdone only by the Netherlands. A very interesting issue is that even in the years 2008–2009, when Germany was struggling with the crisis and its consequences, the inflow of the German FDI to Poland did not decrease, but continued to show a minor yet positive trend (2008: EUR 19.01 bn and 2009: EUR 19.7 bn). As a result, German investors considered Poland a stable place to locate FDI.

Figure 3. The German FDI inflow to Poland in the years 2004–2017 (in EUR millions)



Source: Deutsche Bundesbank, (2019), *Foreign direct investment stock statistics. Special Statistical Publication 10*, Frankfurt am Main, p. 41; Deutsche Bundesbank, (2015), *Foreign direct investment stock statistics. Special Statistical Publication 10*, Frankfurt am Main.; Deutsche Bundesbank, (2011), *Foreign direct investment stock statistics. Special Statistical Publication 10*, Frankfurt am Main, pp. 14 and 49.; Deutsche Bundesbank, (2008), *Foreign direct investment stock statistics. Special Statistical Publication 10*, Frankfurt am Main, pp. 14 and 49.

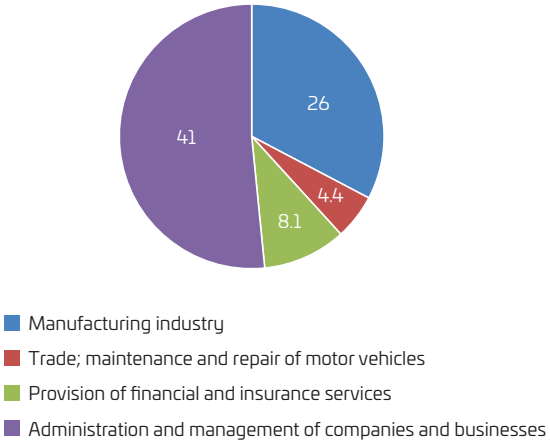
The large scale of German investments in Poland may mean that German companies are intensively involved in cross-border and local supply chains. The result is the ability to obtain and increase their competitive advantages, including controlling the delivery model, and tax optimisation, ensuring adequate quality and production standards, unifying business processes and, finally, distribution control (Czernicki, Czerwiński, Gurbiel, Popławski, 2019, p. 52).

The number of German companies operating in Poland indicates that Germany is the largest investor in the Polish market. At the end of 2017, the number of entities amounted to 4,917, constituting 17.7% of the country's share in the total foreign capital. According to the data of the Polish Central Statistical Office (GUS), 99.1% of this capital was invested in entities with a majority of foreign capital and 88.0% in entities with ten or more persons employed. The majority of German capital was invested in trade; 36.7% in car repair and

32.6% in manufacturing industry (GUS, 2018, pp. 38–41). Comparing this result with the available data for 2006[6], the share of Germany's investments in invested German capital were higher: 48.3% for the manufacturing industry and 31.8% for trade and repair of motor vehicles (GUS, 2006, p. 46).

Analysing the structure of the German FDI in Poland, taking into account the Deutsche Bundesbank data, one can observe the following tendencies: in 2004, the largest percentage of the German FDI in Poland included investments in the administration and management of companies and businesses sector – 41%. It was probably related to the need to build in Poland the foundations of German culture and business management style based on pragmatism, training of Polish staff and direct control of the investor in company management processes. Similar tendencies could be observed in Eastern Germany after 1990 when, in connection with the inflow of FDI from the old federal states in new companies, the management functions were performed by managers from Western Germany. The second group in terms of FDI in 2004 was the processing industry – 23% of all investments, of which about 27.2% were investments in the manufacture of motor vehicles, trailers and semi-trailers. (see Figure 4).

Figure 4. The structure of the German FDI in Poland in 2004 in %



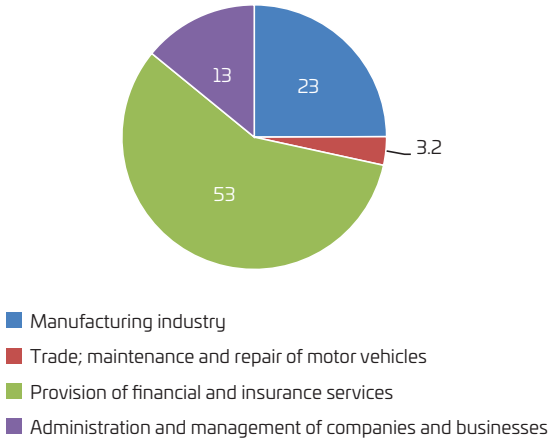
Source: Deutsche Bundesbank (2008), *Foreign direct investment stock statistics. Special Statistical Publication 10*, Frankfurt am Main, p. 31.

In 2017, a significant change in the structure of the German FDI in Poland could be observed. The largest percentage share of total FDI of 53%, was accounted for by investments

6 Since there are no data available for 2004, data from the Central Statistical Office (GUS) for 2006 were used. These data do not include the banking and insurance sectors.

in the provision of financial and insurance services sector. The second-largest group of 23% (a small change compared to 2004), was FDI in the manufacturing industry; about 50% of this group were investments in the manufacture of motor vehicles, trailers, and semi-trailers. The percentage share of FDI in the administration and management of companies and the business sector decreased significantly in comparison to 2004 and amounted to 13% (see Figure 5).

Figure 5. The structure of the German FDI in Poland in 2017 in %



Source: Deutsche Bundesbank (2019), *Foreign direct investment stock statistics. Special Statistical Publication 10*, Frankfurt am Main, p. 41.

In terms of the importance of investment for the development of the Polish economy, based on the list of the largest foreign investors in Poland prepared each year by the Polish Information and Foreign Investment Agency (PAIiIZ), it can be concluded that the large interest of German investors in the sector of industrial production activity (238 companies out of 468 in 2019 represented this sector) was connected with areas that can be classified as medium-high technology[7]. Several research projects conducted in Germany confirm the specialisation in this group of industries[8]. German investors have invested capital in medium-low and low technology departments. However, there is still a lack of German investment in Poland in high technology sectors[9].

7 List of Major Foreign Investors in Poland – February 2019.

8 Specialisation in this group of industries is confirmed by typical research specialising in Germany, see more: Weresa, 2002, p. 140 and Bogdańska-Czyrnek, 2014, pp. 422–423.

9 This situation can be explained as follows: a modern, unique technology is usually a source of advantage for its owners and allows them to achieve high profits. This also applies to the technology of producing cheaper or better goods qualitatively. It is obvious that corporations with such solutions will not be interested in their diffusion to other enterprises and countries.

In the light of surveys among over 300 German companies, the well-known German law firm Rödl&Partner, which serves German investors in the CEE region, presents a picture of Poland as the most important market for German products in this region. It also states that the business activities of German investors after accession in Poland developed best and that loyal and committed employees with the knowledge of German create a great basis for subsidiaries of German companies in Poland (PAIiIZ, 2005, p.19).

Since the analysis takes into account the location of German investments in Poland in the whole analysed period, it is possible to state their concentration in only a few voivodeships: Masovian – 30.6% in 2017, Greater Poland – 23.0% in 2017, and Lower Silesian – 17.9% in 2017 (GUS, 2018, pp. 38–41). The location and development of the investments in these regions may be related to the scale of respective regions development, the availability of the resources, sought knowledge, their respective geographical proximity and the fluency in the German language (this applies to provinces in Western Poland). The analyses carried out, however, indicate that the capital in a given province is located where it is based, and not where it is actually distributed.

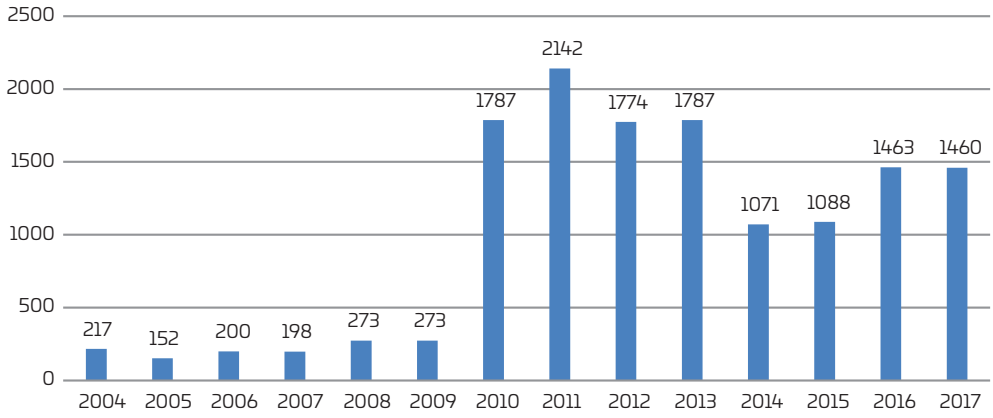
3. Development of the Polish FDI in Germany

According to Germany Trade and Invest, a federal agency providing services to foreign investors, Germany is among the top ten recipients of foreign direct investment (FDI) in the world. According to official Bundesbank statistics for 2017, around sixty percent (or EUR 315 billion of all FDI stocks in Germany originate from within the European Union) with a further nine percent stemming from the remaining European non-EU countries. Germany is a very attractive destination for Polish companies to expand their business. In addition to the strategic foreign trade partnership between the two countries, Poland has enjoyed significantly an easier access to the German market, especially since Poland's accession to the EU in 2004. In mutual Polish-German relations, the phenomenon of asymmetry in the sphere of direct investments is visible. While Germany is one of the largest investors in Poland, Polish investments in Germany are at a much lower level (see Figure 6).

The level of the Polish FDI in Germany has been subject to high fluctuations since 2004, and its development can be considered a standout. In the years 2004–2009, their average inflow amounted to EUR 187.5 million. However, in 2010, we can observe a significant increase in this respect. Such significant fluctuations in the level of investments are evidenced by both multidirectional, dynamic flows Poland-Germany (capital inflows and outflows), as well as by high activity in other geographical directions in Europe. According to experts, investments of Polish companies abroad also result from the proper use of the opportunities offered by the economic crisis in the world. The record-breaking result took

place in 2011, when the inflow of the Polish FDI to Germany exceeded the level of EUR 2 billion. In the following years, this level decreased (the lowest in 2014 – EUR 1,071 billion).

Figure 6. The Polish FDI inflow to Germany in the years 2004–2017 (in EUR millions)



Source: Deutsche Bundesbank, (2019), *Foreign direct investment stock statistics. Special Statistical Publication 10*, Frankfurt am Main, p. 41; Deutsche Bundesbank, (2015), *Foreign direct investment stock statistics. Special Statistical Publication 10*, Frankfurt am Main.; Deutsche Bundesbank, (2011), *Foreign direct investment stock statistics. Special Statistical Publication 10*, Frankfurt am Main, pp. 14 and 49; Deutsche Bundesbank, (2008), *Foreign direct investment stock statistics. Special Statistical Publication 10*, Frankfurt am Main, pp. 14 and 49.

One of the most difficult problems we encounter when trying to analyse Polish investments in Germany is the problem of limited access to data which concern comparable periods and counting with the same method of data on Polish direct investment in Germany. Due to the need to maintain statistical secrecy, the Bundesbank does not publish data on Polish FDI on a regional basis. Nor can we find such information in the reports of the NBP or any other institution. The reason for this may be a small scale of these expenditures. As in the case of preparing information concerning German investments in Poland, the list of the largest investors prepared by PAIiIZ was of some help, a similar list does not exist in relation to investment activity in Germany. This issue is mentioned by the authors of the study on companies with Polish capital operating in Germany from Nicolaus Copernicus University in Toruń (Karaszewski, 2008). They clearly indicate the difficulties in obtaining the necessary information in this field: "Identification of a full address list of companies with Polish capital turned out to be extremely difficult, if not impossible. Polish government agencies, just like the Polish Embassy in Berlin refused to provide information in this regard. The investigation carried out suggests that none of them has complete information on the activities of entities with Polish capital in that country. German sources do not provide such information either. The Bundesbank, as the only institution monitoring the inflow of capital has at its disposal data on the largest companies with Polish capital in Germany, however,

considering the data it possesses to be confidential, it also did not give its consent to make it available. (...) as economic entities operating in Germany are required to be members of the Chamber of Commerce and Industry, the following was included in the request to such units in the Land of North Rhine-Westphalia" (Karaszewski, 2008, pp. 24–25).

Given this situation, only the main directions of investment activity can be identified, but it is very difficult to draw more general conclusions. Moreover, there are many discrepancies in the number of entities and the value of outlays depending on the institution, which also makes it difficult to formulate conclusions and conduct an in-depth analysis of the Polish-German investment activity.

This part of article is based on the data from the annual reports of Deutsche Bundesbank, data from the Germany Trade & Invest agency and the Trade and Investment Promotion Department of the Polish Embassy in Berlin.

According to Germany Trade & Invest (GTAI), in 2017, most Polish companies operate in Berlin (580 companies with 1350 employees), North Rhine-Westphalia (250 companies, 2340 employees), Brandenburg (210 companies, 1740 employees), Saxony (150 companies, 1030 employees) and Bavaria (90 companies, 2850 employees), which is the federal state with the highest number of employees of Polish investors (GTAI, 2017, p.10). The authors of the aforementioned study of companies with Polish capital operating in Germany from Nicolaus Copernicus University in Toruń point out that the most positive influence on the development of the company on the German market is exerted by cooperation with a network of partners, demand on the local market, qualifications of technical staff, competences of top managers and company image. It may come as a surprise that modern technical equipment is of little importance (Długołęcka, 2008, pp. 271–301).

The Polish Embassy in Berlin estimated in 2018 that about 180,000 sole proprietorships with the participation of Polish citizens were based in Germany, including nearly 50,000 craft businesses. Over 40% of the companies operate in the construction industry, almost 15% in services: gardening, trade fairs, real estate and building care. Another 12% of the enterprises are active in trade and vehicle repair services, over 10% in caregiving to the elderly and disabled and in transport and catering. Most Polish entrepreneurs in Germany are self-employed, but the investments of large companies are significant in terms of capital (Olechowski, 2018).

In the years 2011–2016, Polish projects in Germany included the following sectors: 20% of projects were implemented in textiles, 18% in software & IT services, 10% in industrial machinery, equipment and tools, 8% in business services, 7% in consumer products, 7% in metals, and 30% in others. In terms of business activity, 44% of projects came from the sales, marketing & support area, 22% from retail, 9% from business services, 7% from headquarters and 18% from other areas (GTAI, 2017, p. 12).

The investment appeal of Germany for Polish economic entities, apart from quite universal factors, such as political, economic, legal and social situations, which are assessed very favourably in the vast majority of cases is a stable political system, advantageous economic situation, and well-established legal order (Kuzel, 2007, p. 81) along with geographical and cultural proximity, which give a sense of security to the business conducted. The main factors limiting the development are labour costs, labour law regulations and tax system.

Among the basic forms of business activity with foreign participation, the most frequently chosen by Polish investors is the form of subsidiary, i.e. creation of new enterprises or taking over enterprises existing on the foreign market.

Polish companies investing in Germany operate in a wide spectrum of industries ranging from fuel, chemistry, IT to assemblage and construction to trade and services. Germany attracts many Polish companies, which more and more often invest and create jobs, for example, in the fuel, chemical, IT, trade and service sectors. The largest Polish investors in Germany are: PKN Orlen S.A. (its German company Orlen Deutschland GmbH, headquartered in Elmshorn, is ranked 1st in the ranking of companies with the highest turnover in Schleswig-Holstein, which has 570 petrol stations), Grupa Azoty S.A. and Ciech S.A. It is also worth noting that there are cases of German companies taken over by Polish investors, which concerns both medium-sized German companies with well-recognised brands and a well-established position on foreign markets (including non-European). Another group includes takeovers of local companies in a difficult situation from a bankruptcy trustee.

Conclusions

The intensively developing Polish-German economic cooperation in the field of FDI promises its further development and gradual strengthening of contacts between the two countries. Although, as shown in this article, there is a significant asymmetry between the development of the German FDI in Poland and the Polish FDI in Germany, and trying to compare them according to a single key is difficult (problems with access to data on the activity of Polish enterprises in Germany or a relatively small scale of the Polish FDI in Germany), Polish investments in Germany and their development are an important signal of major changes in Polish-German economic relations. It clearly shows the growing potential of Polish enterprises and also brings some benefits to the German economy. Thanks to takeovers by Polish companies, it is often possible to save a German company from closure, a traditional family business operating in the SME sector.

If we take into account the importance of the German FDI for the development of the Polish economy, it must be stated that with regard to the large scale German investments in the manufacturing industry in Poland, companies have invested capital mainly

in medium-low and low technology sectors. However, there is still no German investment in Poland in the high technology area. German FDI has allowed Polish companies to integrate into global supply chains. There is a further need to attract large investment projects to Poland. Appropriate promotion at a high government level plays an important role in this regard. In addition, there is a need to build a national innovation system in Poland that will enable Polish companies to specialise in certain types of production and build their own brands, as it may turn out that without government action, Polish entrepreneurs will only be forced to remain in the position of sub-suppliers at too low a value chain level (Czernicki, Czerwiński, Gurbiel, Popławski, 2019, p.33).

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7 Challenges in Sustaining Germany's Export-Oriented Economic Model

Jürgen Wandel

Introduction

Germany's economy is widely admired as an export-driven success story. According to the German Council of Economic Experts, half of its growth in real income per capita and roughly 30% of jobs in Germany in the last 20 years are attributable to trade (German Council of Economic Experts, 2017; items 629 ff.; 2018, p. 1; Financial Times 2018). Throughout its post-World War II history, the country has tended to run current account surpluses. However, their volume has been soaring since the introduction of the common currency in the European Union, and in particular in the wake of the on-going eurozone crises and has averaged at nearly 8 percent of GDP since 2005 (German Council of Economic Experts 2018, p. 3).

Most economists and politicians in Germany tend to see these surpluses as an indication of the competitiveness of the German economy. Meanwhile, however, doubts about the sustainability of Germany's export-oriented economic model are growing in face of the acceleration of digitalisation, the rise of protectionism in the United States, Brexit fears and a rapid catching up process pursued by the emerging markets, in particular China, which are major buyers of German manufactured goods (Deutsche Bank Research 2019; German Council of Economic Experts, 2018). With its Belt and Road initiative and Made in China 2025 programme, the Chinese government intensified its efforts to expand to other markets, to acquire foreign technology and substitute high-tech imports for domestically

manufactured goods. The aim is to replace the existing foreign technology leaders in the medium term and to unpick the value chains in manufacturing by switching from cheap, low quality labour-intensive goods to higher value goods and services (Tilford, 2018; DB Research, 2019).

This increasing pressure on Germany's export-oriented economic model to remain internationally competitive and hence to sustain prosperity and a high-level of employment triggered a debate about the most important challenges the German economy faces and how they can be met best. The discussion gained new momentum, when growth prospects started to deteriorate in the last quarter of 2018[1] and then in February 2019, Germany's Economy Minister Peter Altmaier published the so called National Industrial Strategy 2030. The ministry lays down in it its view on the challenges Germany encounters and provides policy proposals to sustain leadership on international markets. The authors of the document deplore that Germany is no longer an international top player in new ground-breaking innovations and key technologies, such as artificial intelligence, and is about to fall even further behind competitors from the United States or China. In order to secure and regain a leading role on global markets, the strategy advocates increasing pro-active government interventions, in particular raising the manufacturing share in GDP both in Germany and in the European Union, increasing the domestic value-added content of exports and promoting national champions (Altmaier 2019).

Against this background, the study takes up the debate and reviews the challenges Germany faces to sustain its export-oriented economic model and the related policy implications as addressed in the National Industrial Strategy. In this connection, it applies an analytical framework that draws mainly on the Market Process Theory as developed by 1974 Nobel laureate Friedrich August von Hayek and Israel Kirzner combined with insights of the institutionalist theory of economic development. The market process theory identifies informational constraints of economic and political actors for achieving the desired ends as the central economic problem (Hayek 1937, 1945) and concludes that dispersed knowledge and information held by various actors can only be utilised fully and efficiently to promote wealth in a decentralised market system with free pricing and competition, which is understood as a dynamic open-ended process of entrepreneurial discovery (Hayek 1978).

Institutional scholars demonstrated that economic progress relies crucially on the right rules of the game (formal and informal institutions) as they determine whether people get engaged in productive, unproductive, or even destructive behaviours (Acemoglu & Johnson, 2005; Acemoglu & Robinson, 2012; Baumol, 1990; Leeson & Boettke 2009, North et al., 2009, 2012). From this follows that an analysis of actual challenges and its policy implica-

1 Germany's economic prospects turned down with the growth shrinking to –0.1% in the second quarter of 2019. Output fell across the three months to June by 1.8% compared with the first quarter of the year, driven by steep drops in metal production, machinery and automobile manufacturing (Guardian, 2019).

tions for sustaining Germany's export-oriented economic model has to focus primarily on the weight that is given to competition as an entrepreneurial discovery process and on the requisite institutional conditions.

It will be argued that Germany's threatened leading role on the world markets is mainly related to an unfavourable domestic institutional environment for productive entrepreneurship and to the ultra-loose monetary policy of the European Central bank that prevents Schumpeterian creative destruction and structural change. Yet, rather than to provide an in-depth empirical analysis, the paper offers a starting point toward reconsidering the longevity of Germany's industry-focused export-oriented economic model and the feasibility of deliberate design and steering of economic progress both nationally and internationally by highlighting insurmountable epistemic and motivational constraints.

The remainder of the paper is organised as follows: Sections 2 and 3 examine the importance of manufacturing and the global value chains for prosperity, Sections 4 and 5 discuss the role of technology and firm size for economic progress, while Sections 6 and 7 respectively review external and domestic impediments to the economic upgrading in Germany. Section 8 explores policy implications and section 9 provides conclusions.

Manufacturing and economic prosperity

Germany's exports are dominated by traditional manufacturing goods. They are led by vehicles and vehicle parts, which in 2017 represented 18.4% of the total exports of Germany, followed by machinery (14.4%), chemical products (9.0%) and computer and electrical equipment (8.7%). The main imported goods were of a similar kind with vehicles and vehicle parts having a share of 11.2%, computer/electrical equipment 10.9%, machinery 8.0% and chemical products 7.6%. While the trade in goods typically records a surplus, Germany's trade in services usually runs a deficit. In 2017, the trade surplus of goods amounted to €245 billion, which was opposed by a deficit on trade in services of €18.7 billion. (Bundesministerium für Wirtschaft und Energie, 2018).

The preponderance of industrial goods in Germany's exports prompted the policy makers in (e.g. Altmeier, 2019, p. 4f.) and outside Germany to see a strong industrial sector as a prerequisite for competitiveness and prosperity. For example, Poland's Morawiecki plan for a responsible development contains therefore reindustrialisation as one of its explicit goals. Similarly, US President Donald Trump calls for more manufacturing jobs in his country (Ydstie, 2018). Germany's new National Industrial Strategy even suggests a quantitative target to increase the contribution of manufacturing to the total German gross value added from 23% in 2018 to 25% and in the EU as a whole from 16.4% to 20% in 2030 (Altmeier 2019, p. 4).

Yet, there is neither convincing empirical nor theoretical foundation that only a large industrial sector can maintain high economic growth and a country's innovation capacity. While there are indications that countries with a current account surplus tend to have a high share of manufacturing in gross value added (Table 1, see also Grömling 2014), it does not imply that countries with a deficit are worse off. Zettelmeyer (2019) showed that countries whose manufacturing share declined more than in Germany usually grow more rapidly and experienced no collapse of their innovative capacity. For example, the United States has a manufacturing share of only 12% and nevertheless is still quite innovative.

Table 1. Share of manufacturing and current account balance in GDP

Country	Manufacturing, value added (% of GDP)		Current account balance (% of GDP)	
	2007	2017	2007	2017
China	32.38	29.3	9.95	1.6
South Korea	25.46	27.5	0.93	4.91
Japan	22.07	20.72	4.69	4.15
Germany	21.09	21.06	6.85	8
Ireland	17.94	31.65	–5.13	1.01
Switzerland	17.65	17.9	9.98	6.68
Italy	15.95	14.88	–1.38	2.65
Spain	13.47	12.84	–9.67	1.9
USA	12.78	11.15	–4.92	–2.26
Netherlands	12	11.05	5.9	10.8
France	11.63	9.99	–0.33	–0.63
United Kingdom	9.02	8.97	–3.56	–3.33

Source: the World Bank Data, https://data.worldbank.org/indicator/BN.CAB.XOKA.GD.ZS

From the market process view, the economic structure of a country is the result of competition as an entrepreneurial-driven discovery procedure reflecting the country's respective institutional conditions and relative competitive advantages at the international level. Therefore, this structure differs across countries and changes over time. Among developed countries, with 21%, Germany has actually one of the highest manufacturing shares of gross value added. This is commonly attributed to a strong demand for German cars and traditional capital goods from catching-up emerging countries and especially from China. These countries need these products for their industrial development and appreciate in particular the quality of German cars and machine tools (Foders & Vogelsang 2014; Marin et al., 2015; Südekum 2018). Moreover, as Grömling (2014, p. 32) noted, despite progress in modern information and communication technologies and an increasing trend towards outsourcing in the service sector "a considerable range of services are still not internationally trada-

ble." Therefore, the international division of labour is still more advanced in the production of goods than services. Finally, international trade liberalisation has so far favoured goods over services. So, for the time being Germany's high manufacturing share in exports and its economic structure must indeed be seen as the result of superior entrepreneurship and competitiveness of these products. It reflects the country's comparative advantage, which is particularly strong in the field of middle-range technologies (Foders & Vogelsang 2014).

However, it is expected that this high share of manufacturing cannot be sustained in the near future primarily for two reasons (Berthold, 2017, 2018). First, many emerging markets are catching up and have meanwhile become industrialised. They will climb the value-added chain so that they are likely to become more important competitors for numerous industrial products. As Felbermayr underscored in an interview for the journal "Wirtschaftswoche" (2019), the dynamics of this catching-up process has given trade of manufactured capital goods a special boom, from which Germany has benefited. This special boom is going to end now and the structural change towards services is intensifying. As a result, the global trade, consisting of up to 85% of industrial goods so far, might slow down.

Not only does the demand for trading partners shift, but also factors in Germany will necessitate structural changes and hence constitute the second reason for a declining importance of manufacturing in the near future. As income rises, people's consumption of services grows faster than that of manufactured goods (Murata, 2007). At the same time, innovations such as robots and offshoring of production tend to raise productivity in manufacturing higher than in services (Pilat et al. 2006). As in most other advanced economies, manufacturing jobs will be replaced by service jobs, for example in research, consulting, and other business services (Zettelmeyer 2019). Against this background, the German government would be ill-advised to prevent or even reverse this natural development of the market process.

Global value chains and competitiveness

Similarly, there is a questionable suggestion made by the German government to limit German and European firms participation in international value chains to the European Union in order to make "the individual links in the chain .... more resistant to trade and other geopolitical disruptions" and so also to increase the likelihood "that a competitive lead can be achieved or extended." (Altmeier, 2019, p. 11).

As the EU Commission (2019) reports, Germany's automotive sector has one of the most internationalised value chains in the world. In 2017, about 66% of German-branded vehicles were produced abroad. In a similar vein, German equipment manufacturers rely heavily on suppliers located in other countries, notably from the rest of the EU, representing up to 80% of the value added. Just as the economic structure of a country, the global value

chains are principally a natural outcome of the market process. They are actually a further development of the division of labour. It is a largely undisputed insight of economics that goes back to Adam Smith and David Ricardo that the division of labour according to comparative advantages made possible by the voluntary exchange process on the marketplace is the major driver of efficiency and prosperity, both within and between nations. The larger the extent of the market, the further the specialisation can go. Innovations in communications and transportation technologies, together with institutional and market reforms have extended the market ever further and enable specialisation at a very detailed level.[2] Alert and creative entrepreneurs try to exploit this benefit of trade and assign the production steps to those countries where they can be performed most effectively. Thereby, they are aware of the risk of disruption and weigh it against the cost advantages of slicing up the value chain to countries beyond the EU. By assigning various stages of the production process to the most efficient units in various countries, international value chains increase productivity and prosperity (Baldwin 2016). In contrast, the more restricted the economic area over which this unbundling is possible, the smaller the potential efficiency gain.

Marin (2018) shows how beneficial the expansion of production networks to Central and Eastern Europe has been to the competitiveness of German firms. It has helped entrepreneurs to keep costs down, win market shares globally and sustain employment in Germany. Therefore, there is no economic justification for the government interventions into the international global value chain formation. In the market process view finding its place in the international value chain is the task of private entrepreneurs, because they have the best knowledge of how to best meet consumer needs. This, of course, includes also the possibility of relocating production stages when deemed profitable. The 2019 Global Value Chain Development Report does not rule out that new digital technologies such as Internet of things, big data analytics, and autonomous robotics might have such an impact on GVCs and encourage the re-shoring of manufacturing production. The opposite is equally likely. They might strengthen GVCs by reducing coordination and matching costs between buyers and suppliers even further (World Bank; World Trade Organisation 2019).

The role of technology

The National Industrial Strategy sees the key to sustain international competitiveness in ground-breaking technologies (Altmeier, 2019, p. 9). It contends that it is very difficult for competitors to catch up once they have lost technologies to other competitors or fallen behind technological developments. To exemplify, it mentions biotechnologies, artificial intelligence,

2 For more detail on the GVC phenomenon see e.g. Amador et al. (2016); Baldwin (2016), Blanchard (2019) or Johnson and Noguera (2017).

Internet companies of the digital platform economy which are "currently developing almost exclusively in the USA and in China". The strategy also laments the loss of Germany's leading position in the entertainment electronics in the 1970 s to Asian countries like Japan and South Korea, which it sees as the reason for "the inability of Europe to get a foothold in the new fields of telecommunications technology and computer electronics" (e.g. smartphones, tablets, etc.). Fears are expressed that also Germany's major industry, the automotive sector, might miss ground-breaking innovations, which the ministry sees in autonomous driving, electromobility and the development of completely new mobility concepts. Integrating digital technologies into traditional industrial products is identified as one of the major challenges for the German industry. Therefore, the government plans "to promote innovative technologies to a greater extent and to protect strategically important areas." (Altmeier, 2019, p. 2).

From the perspective of the market process theory and institutionalist development economics, this conclusion and the arguments on which it is based are unconvincing. Firstly, it rests on the belief that what matters most for growth is innovative technology and grasping those stages of the global value chain that are deemed to create the greatest value added. It is true that according to the neoclassical growth theory, technological progress in general improves productivity and hence raises prosperity (Solow 1956). Yet, what ultimately matters, is not technology per se, but *how* technology and other production factors are used – in a productive, unproductive, or even destructive way (Boettke & Piano 2016). Baumol (1990) and other institutional economists like Acemoglu and Robinson (2012), North (1990), North et al. (2012) or Olson (2000) demonstrated that this depends fundamentally on the formal and informal institutions, because they shape the incentives underlying individual actions. Baumol (1990, p. 291) said that e.g. medieval China, the most technologically, scientifically, and culturally advanced society of the world for many centuries, was unable to produce sustainable economic growth, because the rules of the game "were heavily biased against the acquisition of wealth and position" through Schumpeterian entrepreneurship.

Secondly, governments cannot have the knowledge to identify profitable technologies. What matters in a market economy is not the general technical feasibility to produce something, for example e-cars, but that consumer preferences are met. The knowledge to find this out is needed much more than the scientific knowledge of experts of pure technological opportunities and contexts. It is what Hayek (1945, p. 521) refers to as "the knowledge of the particular circumstances of time and place", i.e. information of what is needed, who needs it, and who has the means to meet these needs. This kind of knowledge is not only constantly changing, it is also dispersed and fragmented among the millions of individuals who compose the society and are often held in inarticulate forms.[3]

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[3] This knowledge is accumulated from everyday experience as a result of interacting with others, e.g. customers and suppliers, and "the amount of knowledge each of us possesses to do much of the everyday things of

Moreover, taking into account the limited cognitive abilities of every human being to capture and process all this multi-layered, interconnected knowledge that only resides as scattered and decentralised bits of information in the minds of individual members of society, the market process theory holds it impossible that a centralised body of experts and politicians will be able to find out technologies that really meet consumer preferences. An illustration, of how technologies favoured by policy typically miss consumer demand is Germany's support of electromobility. In a round-table interview in Munich in June 2019, BMW director of development, Klaus Fröhlich stated that "there are no customer requests for battery-electric vehicles (BEV). None. There are regulator requests for BEVs, but no customer requests" (Forbes, 27 June 2019). In the view of the market process theory, the information what consumers really want can most reliably only be generated and transmitted by market competition through profit-and-loss feedbacks and the changes in relative prices.

Does the firm size matter?

A further alleged challenge put to discussion by the National Industrial Strategy is the role of the firm size for innovations and international competitiveness. The Economy Ministry holds that with regard to it the ability to create very large companies does matter, the examples are: Apple, Amazon, Google, Microsoft and General Electric. By contrast, "hardly any new enterprises of this size have emerged in Germany for years and that instead former world leaders such as AEG or Grundig long lost their position." It is argued that only large enterprises "make a substantial contribution to value added" (Altmeier, 2019, p. 14) and therefore the long-term success and the survival of national champions are regarded to be "in the national political and economic interest." In order to create national and European champions, it is suggested to review the current EU competition law which is seen to prevent the creation of such companies.

Like the economic structure and technology in a market economy, the firm size is the result of the market process under the prevailing institutional conditions. Thereby product, production or specific conditions, such as economies of scale, network effects, critical masses and access to extensive data may necessitate a larger firm size and create what Bourne (2019a, p. 2) calls "winner-take-all markets that tip toward one company being persistently successful for a period". However, in an unhampered market process, and this dominant position is never eternal. It is always contestable over long periods, with dynamic innovation and competition. Bourne (2019a) reviewed a number of cases, which were widely consid-

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life, but which we would find difficult to articulate and express in clear detail in any spoken or written form" (Ebeling 2014).

ered unassailable "monopolies", such as Myspace, Nokia, Kodak, Apple's iTunes, Microsoft's Internet Explorer. None of them enjoyed continued dominance, and disintegrated or disappeared in the face of technological innovations or rival competitors with differentiated products, just as Schumpeter theorised (see also Haucap, 2019).

Moreover, there is no convincing causality between the firm size and innovation. As the National Strategy itself mentions Germany's hitherto success with classical manufacturing of goods on world markets is owed to a large extent to small and medium-sized enterprises. There is no theoretical and empirical foundation to expect that they might not be able to cope with "the rapid pace of innovation and in particular digitalisation, just because their special technological capabilities have hitherto been in other areas". Smaller firms usually have less hierarchy and are thus closer to information on market demands and quicker to improve product quality or introduce new products (Marin, 2018). By contrast, larger firms often encounter coordination and principal agency problems, inflexibilities and conservative behavior which might offset potential advantages in raising funds for research and development (Döring 2012). In the market process view, it is not the firm size that matters for innovative behaviour but intense competition with unhampered and undistorted profit-and-loss feedbacks. Fierce competition forces producers to constantly innovate and improve what they offer and how they produce it to prevent their customers from defecting to others.

Haucap (2019) showed that large-scale mergers often lead to reduced spending on research and development, and in turn to less innovation. Moreover, if the government assigns certain firms the status of national champions, this might imply an implicit or explicit state guarantee, which typically promotes moral hazard and entrenches economic power to detriment of other competitors and potential customers of these companies. In fact, the National Industrial Strategy points into this direction stating that "the long-term success and the survival of such enterprises is in the national political and economic interest" (Altmaier 2019, p. 12).

Unfair international competition

A severe threat to Germany's leadership in international markets is seen in expansive and protectionist industrial policies of other countries, in particular China and the USA, which is labelled as unfair competition. For example, the Obama administration in the USA provided extensive support for research and development in artificial intelligence, digitalisation, autonomous driving and biotechnology. The Trump administration undertakes great efforts "to revitalise and protect traditional industrial sectors ... with its "America First" policy and to relocate lost shares in value added to the USA (Altmeier, 2019, p. 4). At the same time, in 2015, China launched its "Made in China 2025" agenda, which intends

to strengthen key technologies in ten selected sectors through an active industrial policy (p. 6) in order to gradually replace foreign technology with Chinese (see also BDI 2019a; McBride and Chatzky 2018). What is deemed unfair in this process is the direct or indirect subsidisation of Chinese competitors by an undemocratic authoritarian government, which might pursue geo-strategic goals. Of particular concern are Chinese takeovers of German or EU companies to acquire the state-of-the art technology. Therefore, the ministry plans to prevent such acquisitions in order to "defend against risks to national security, including the area of critical infrastructures" (p. 12) through purchases of those shares by the German government for a limited period of time.

This suggestion is implicitly based on two misconceptions: (1) the mercantilist fallacy that views trade as a zero-sum game where countries compete against each other and can only win if the other loses, and (2) the level playing field fallacy. The classical trade theory shows that voluntary trade is always beneficial to both sides, otherwise they would not engage in it. These benefits from trade do not disappear when foreign governments intervene in their economies more than in their own, e.g. through subsidies (Lemieux, 2017). This is actually what the level playing field argument fails to see. As Krugman (1997) contended that although government regulations and taxes are part of the comparative advantage landscape and change relative prices, they do not extinguish comparative advantage and the benefits from trade. Therefore, attempts to create a level playing field by subsidising, sealing-off or other protectionist measures are in fact self-damaging. When a trading partner subsidises its exports it unlevels the playing field, however, in favour of the importing countries and against its own citizens. The consumers of the importing country gain from lower prices for imports and their real incomes rises. Resources released in import competing industries can then be invested in the creation of high paying jobs to produce goods and services where they were previously too costly to produce. The most obvious negative consequence of restrictions on takeovers of German firms by certain foreign investors, e.g. from China, is that it could stifle desirable Chinese foreign direct investment for restructuring weaker companies or providing risk capital for start-up firms. Germany should instead keep its economy completely open and unhampered from government interventions irrespective of what other countries may do (Lemieux 2017; 2018a; Rodrik 2018; Krugman 1997).

Domestic impediments

The level playing field or "fairness" argument usually diverts attention from domestic impediments for German enterprises to sustain leadership on global markets. As shown in Wandel (2018), under the chancellorship of Angela Merkel the market process has increasingly been stifled by socially and ecologically motivated regulations. Examples are

the nationwide minimum wage, the rent break or the energy transition to renewables. Lately in September 2019, the so called agricultural packet was passed with further detailed regulation of the use of inputs in production processes (Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit, 2019). In addition, enterprises are plagued by a high tax burden on corporations and one of the highest electricity costs in Europe (Wolff 2018).

This growing government interference with the market process is reflected in the 2019 Index of Economic Freedom Ranking of the Heritage Foundation (2019). While business, trade and investment freedoms are still considered strong with 83.3 (86.7), 86(87) and 80 points of maximum 100, government spending (42.3), labour freedom (52.8), and tax burden (60.8) have relatively low scores. Germany's overall ranking deteriorated from the 17th place worldwide in 2015 to the 24th; in Europe from the 7th in 2015 to the 14th. Similarly, in the 2019, the Ease of Doing Business index of the World Bank ranked Germany 24th out of 190 countries, down from 14th in 2015.

As a consequence, investment activities and productivity gains are low, while rent-seeking is stimulated. The EU Commission (2016) reported that "since the beginning of the last decade, the rate of investment in Germany has been significantly lower than in the rest of the euro area." The proportion of German GDP going to investment fell from 21% in 2000 to 17% in 2013 and even after the euro crisis, it remains below the EU average of 23% with its 20% (EU Commission 2019). According to the IMF (2019, p. 69f) corporate investment in Germany has remained at relatively low levels with around 12–13% of real GDP since the mid-1990 s. Yet, while German companies are reluctant to invest at home, they continue to invest abroad, especially in the fast-growing Asian markets (Financial Times, 2018b). Görg (2019) pointed to the mismatch between the inflow and outflow of foreign direct investment (FDI) in or out of Germany as indication for the declining attractivity of the country as an investment location. As of 2017, FDI inflows to Germany amounted to USD 931 billion, while FDI outflows of USD 1,610 billion were 1.7 times higher. In the United Kingdom, Ireland, the USA and China FDI in- and outflows are much more balanced. The German Council of Economic Experts (2018, p. 161) found in its 2018/19 annual report that productivity gains were remarkably low in the upturn following the 2008 global financial and eurozone crisis. The growth in total factor productivity (TFP) dropped from nearly 1.6% in 1991 to below 0.5% in 2009 and has remained at a relatively low level of 0.6% since then (see also Elstner et al., 2018).

As Baumol (1990) emphasised, the more regulated the economy is, the more effort entrepreneurs devote to innovations in unproductive or even destructive rent-seeking procedures, because this promises greater returns than investments in productive technologies which improve productivity and better serve consumer needs. Germany's energy transition is a case in point. It is a big rent-extraction seeking machine that brought about a host of interest groups with vested interests that all owe their existence to the current centrally

planning-type support system (Wandel 2015). The lucrative subsidy scheme caused traditional producers, such as RWE, E.ON, or Siemens to switch into the renewables business (Wiwo 2014).

Not only does the unfavourable investment climate in Germany contribute much to the loss of productivity gains but also the ultra-loose monetary policy of the European Central Bank as it conserves inefficient business structure and prevents creative destruction. As Gunther Schnabl (2019) explains, prior to the introduction of the common currency, the stability-oriented monetary policy course of the Deutsche Bundesbank put the German mark permanently under upward pressure which incentivised German entrepreneurs to continuously improve efficiency through innovations in order to stay internationally competitive. The devaluation of the euro due to the EBC's loose monetary policy released that pressure and created windfall profits for German exporters without the need to increase productivity (see also Schnabl, 2017).

According to the Mises-Hayek business cycle theory (Mises 2009/1912; Hayek, 1935, 1966/1929), an artificial expansion of money supply which pushes interest rates for bank credit below what would have been determined on the free market by time preferences, inevitably leads to a large-scale misallocation of resources, because these artificially favourable refinancing conditions trigger investment projects with lower expected returns (Mises 1998). The longer such an expansionary monetary policy is pursued, the more unprofitable enterprises stay in business with higher free market interest rates. This cements the economic structure and impedes the most important feature of the market system – creative destruction and the constant reallocation of resources. In the literature, this situation is referred to as the zombification of the economy. It means that more and more firms which are unprofitable, unable to pay even the interest on their debt out of their profits, are *kept alive* by banks continuing to lend them money to repay their existing loans. These companies which are effectively bankrupt but do not go out of business are termed "zombie companies", following the paper by Caballero et al. (2008). This phenomenon was observed first in Japan, after their real estate and stock market bubble burst in the early 1990 s, to which Japan's central bank reacted with a similar extremely expansionary monetary policy. Lately, the Bank for International Settlements (BIS) documents this phenomenon for the Eurozone (see e.g. Schivardi et al., 2017; Banerjee and Hofmann, 2018). According to McGowan et al. (2017), there are meanwhile more zombie companies in Germany than in Japan. As Banerjee and Hofmann (2018) and Mahtani et al. (2018) show zombie companies are kept alive only with low interest rates and/or lax banking regulations which act as what Kornai (1986) called soft budget constraints. Yet, if enterprises can expect to get always a cheap credit without tight conditions with respect to profitability, this expectation discourages the pursuit of innovation and cost savings. At the same time, their presence discourages investment in and employment at more productive firms (Hoffmann & Schnabl 2016).

Moreover, economically more sound firms have an incentive to substitute fixed capital investment by speculation in the financial markets, because the European Central Bank crisis management drives up asset prices (Schnabl 2017, p. 10). Hence, resources are misallocated, which, as numerous studies have shown, slows the growth of the entire economy (Andrews et al., 2018).

Policy implications

If, as seen from the standpoint of the Hayek-Kirzner market process theory and institutional economics, the ultimate cause for Germany's stagnating international competitiveness is an unfavourable institutional framework coupled with the perverse incentives of the ECB's monetary policy for productive entrepreneurship, then economic policy measures should be aimed at removing all these obstacles that stifle competition as a discovery procedure and creative destruction. However, political economy constrains make this option not very attractive. It is even more difficult to bring about a fundamental change of the ECB's monetary policy. The logical political prescription that flows from the Hayekian business cycle and market process theory is to stop an artificial monetary expansion and allow creative destruction to proceed as fast as possible with its work of readjustment. Yet, not only does Germany not have much power to influence monetary policy given the voting procedure of one country one vote in the ECB. It. would also be related to tremendous political and social cost. If the central bank raised interest rates significantly, it would soon cause a major bankruptcy wave. But, the continuation of this course is no better alternative, because it only delays the needed Schumpeterian creative destruction (Schumpeter 1934). And this means permanently reduced productivity and slower economic growth. Because of this impasse, Schnabl (2017) considers Germany caught in a low-interest rate and export trap. Germany owes its current success on the labour market to its export industry that thrives largely due to the undervalued euro and not because of productivity gains.

In this seemingly hopeless situation, it appears attractive for policy makers to respond to the existing economic challenges with more government interventions and economic nationalism (Hayek 1944.). This is the direction of Germany's National Industrial Strategy with its suggestion to restrict inward direct investment, bring back value chains, to foster national champions and favour certain technologies. Admittedly, the document does not base its policy recommendations on the export trap explanation nor on suffocating domestic regulations for private entrepreneurship. Instead, it points to the alleged shortsightedness of private business "that has its sights set on its own advancement and not that of the entire country.... and on supposed market failure that prevents market forces in a country from maintaining "its innovative strength and competitiveness." (Altmeier, 2019, p. 2).

Any form of industrial policy, however, is plagued with two fundamental insurmountable problems: limited knowledge and perverse political incentives. For policymakers to improve the resource allocation that the market process generates and to predict successfully an unknowable future, they would need to possess superior knowledge as compared to market actors. As explained in section 4, this is impossible not only due to the limited cognitive abilities to grasp and process the vast amounts of dispersed knowledge in a complex and ever-changing market process. The policymakers are also exposed to different incentives. While alert private entrepreneurs invest their own resources, they must be careful and astute when making investment decisions. In contrast, government bodies are generally institutionally precluded from capturing pecuniary profits in the course of their activities. But even when they could, they often do not face the same constraints as private firms. They usually use taxpayer money and do not face bankruptcy in the case of long-term losses. This encourages risky behaviour and investment often in large-scale, visible projects that are deemed to contribute to economic growth, but in fact often turn out economically not viable. At the same time, industrial policies facilitate rent-seeking and regulatory capture by politically powerful groups looking for selective benefits that provide them with advantages over rival firms. Therefore, politicians' self-interest combined with their limited knowledge raise serious doubts that they will and can successfully promote the industrial policy. (Kirzner, 1978). In fact, cases of failed sector- and firm-specific industrial policies abound: (see e.g. Pack and Saggi 2006; Naudé 2010). Some of the most prominent examples of unprofitable industrial policy projects from Germany are Transrapid, Cargo Lifter (see Schnellenbach, 2019), the failed investments of Nokia in Ruhr-area and of Bombardier (see Klodt, 2017) in the city of Halle and the energy transition with the decline of the solar industry in 2011 and the wind power sector since 2018 after the German government changed the support scheme from fixed feed-in tariffs to a tendering model in 2017 and removed privileges for community wind farms (Spiegel-Online 2019).

The proponents of national industrial policy often point to East Asian countries like Japan, South Korea or China as showcases of what such policies allegedly can do (e.g. Rodrik, 2013; Greenwald and Stiglitz, 2014). Referring to China, Germany's National Industrial Strategy contends that a policy approach "that combines market economy principles with proactive and flanking policy, has so far proved most successful". However, the empirical evidence is weak that industrial policy makes the difference rather than economic freedom (Noland and Pack, 2003, 2005; Robinson, 2009). In fact, East Asian tiger countries have relatively high scores of economic freedom and are among the most economically free countries in the world. While none of these economies constitute completely free market economies, it is difficult to maintain that they owe their success to high levels of state intervention rather than to an institutional framework which is conducive to productive entrepreneurship (Pennington, 2011). Likewise, China's economic growth of unprecedented

proportions was set off by the establishment of private property rights and other economic freedoms since 1978 (Coase and Wang 2012; Lardy 2014; Zhang, 2015). A working paper from the World Economic Forum released earlier this year stated that it is China's private sector which serving as the main driver of China's economic growth (Guluzade, 2019), Similarly, Zhang (2015) underscores that the reason for China's sustained economic growth was the relaxation of government control so that the government managed less and the proportion of state-owned enterprises decreased, not the other way around. By contrast, China with its economic slowdown since 2014, overcapacities in key industries, loss-making factories, volatile and declining stock prices and property values and high total debt to-GDP of nearly 300% is not in the least attributed to too much state involvement all the time (see e.g. Dorn, 2015; Grass, 2019; Lardy, 2014).

In the 1970s and 1980s, it was Japan whose economic success on the world market was attributed in large part to government involvement in the economy through the Ministry of International Trade and Industry (MITI). Yet, there is no convincing indication of a causal relationship between the industrial policy and Japan's economic success. By contrast, there is much evidence that the Japanese economy flourished *despite* the activities of MITI, because entrepreneurs were exposed to relatively intense competition (see e.g., Beason and Weinstein, 1995; Henderson 2017). Meanwhile, after decades of outstanding economic growth since World War II, Japan's economy faltered in 1990 and has been stagnating ever since in spite or – in the view of the Mises-Hayek overinvestment business cycle theory – because of massive government interventions through several fiscal stimulus packages, recapitalisation of banks and monetary easing over the last 20 years (see e.g. Schnabl, 2012).

Reframing the issue from picking market winners to losers (in particular coordination failure and information externalities) as suggested e.g. by the Hausmann-Rodrik team at Harvard University (e.g. Greenwald and Stiglitz, 2014; Hausmann and Rodrik, 2003; Rodrik, 2004, 2008, 2010, 2013) does nothing to resolve the fundamental problems of industrial policy. Not only are there insurmountable practical difficulties to pin down market "failure", as even proponents of this so called new industrial policies overtly admit (Hausmann et al., 2008; Rodrik 2008), but there is also no convincing theoretical foundation, from the perspective of the Hayek-Kirzner market process theory. The market failure argument is anchored in the benchmark model of perfect competition, which portrays competition as an allocation mechanism leading to completely predictable outcomes in the form of market equilibrium. However, this is an unreachable utopian ideal, so that compared to this ideal, the real-world markets must necessarily "fail" all the time (Bourne, 2019b; Carden and Horwitz, 2013). As already noted, according to the market process theory, competition is primarily understood as a discovery procedure, the concrete outcome of which is unpredictable. If it were, competition would be unnecessary. It follows from this that it cannot be announced that one can improve the performance of the market to bring about a desirable

sectoral composition (Kirzner, 1978). For Hayek (1990, p. 169), the pretense to know this is "the extreme of hubris. Guided progress would not be progress." In order to perform its discovery function, market competition does not need to be perfect (Hayek, 1990). On the contrary, as Kirzner (1973) showed, it is precisely the so called "market failures" that offer an unexploited profit opportunity for entrepreneurs. It is the market process itself that over time corrects unsatisfying states of affairs and effectively improves coordination, because it itself "engenders the incentives and information necessary to discover and correct its own maladjustments in the allocation of resources" (Sautet, 2010, p. 87). This, however, requires an appropriate institutional framework that keeps markets open, secures private property rights and the rule of law, and does not distort price signals and confiscate away profits though taxation. In fact, a growing body of studies provides empirical evidence that more economically free countries or subnational regions encourage more entrepreneurial activity and economic growth (see e.g. Bjørnskov and Foss, 2012, Boudreaux and Nikolaev, 2019; Nikolaev et al. 2018; De Haan et al., 2006, Tuszynski and Stansel, 2018; Wagner and Bologna Pavlik, 2019).

Conclusions

Germany's industry-based export oriented economic model is faltering. Investment and productivity growth as well the development of ground-breaking innovations are weak and demand for its traditional capital goods from emerging markets is slowing down. This puts Germany's economy under mounting pressure for upgrading and adapt to demand shifts and dynamics on the global market as well as structural and technological changes as digitalisation and innovation become increasingly important drivers of value added (IMF 2019).

Although the German government is aware of the eroding competitiveness, it fails to diagnose properly the ultimate causes in its 2019 National Industrial Strategy. Rather than external threats from other countries, shortsightedness of private business and market failures, the impediments are home-made overregulation of the economy coupled with the undervalued common currency of the European Union. The appropriate therapy is therefore not less, but more of the market economy. Interestingly, this is what the National Industrial Strategy says itself in its foreword, while the rest of the documents and its concrete policy proposals point to the opposite direction. Thereby, it underestimates the insurmountable informational and motivation problems with an industrial policy of whatever kind. Yet, as Hayek (1989, p. 55) pointed out, "If man is not to do more harm than good in his efforts to improve the social order, he will have to learn that in this, as in all other fields where essential complexity of an organized kind prevails (such as in the modern market economy), he cannot acquire the full knowledge which would make mastery of the events possi-

ble. He will therefore have to use what knowledge he can achieve, not to shape the results as the craftsman shapes his handiwork, but rather to cultivate a growth by providing the appropriate environment, in the manner in which the gardener does this for his plants."

A remarkably large part of the German corporate sector is quite critical about the state taking a more active role in the form of state participations (see e.g. BDI; 2019b, Sueddeutsche Zeitung, 2019). This shows that German companies are less concerned about sufficient state intervention and protection and more about a favourable institutional and policy framework in Germany (and in the EU) which removes barriers to productive entrepreneurship.

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8 Germany's and Poland's Positions on the New EU Industrial Policy. Common and Conflicting Interests

Adam A. Ambroziak

Introduction

There has been a long discussion on the concept, scope, needs, instruments and effects of industrial policy. On the one hand, the supporters of industrial policy claim that there is a room for manoeuvring and a broad range of tools which should be applied by governments to intervene in the market to achieve the defined political and social-economic objectives. On the other hand, the opponents argue that the best industrial policy is a lack of industrial policy (see more Ambroziak, 2017a). A similar discussion, not necessarily based on theoretical assumptions and experience confirmation, took place in the European Union (Ambroziak, 2014). Both protectionist and interventionist actions were revealed after the crisis period of 2008–2010. Then, one could observe a lively discussion on a weakened position of industry in the EU, massive and aggressive unfair activities of third country competitors, which disturbed competition within the EU internal market. At the same time, the EU faced new opportunities and challenges derived from expansion of new technologies, digitalisation, servitisation, new business models (Ambroziak, 2017b) as well as problems concerning climate changes and needs for improving energy efficiency.

It is worth noting that all parties to a discussion on the EU industrial policy consider it in a different way. There is a group of countries which strive to make the European industry carbon free or at least make the economy climate neutral. Other member states opt for a protection against third country competitors, who often act unfairly according to the EU

due to their strong connections with the government of the country of origin or even directly the governmental/state ownership. Apart from a stronger protection against companies from outside the EU, they are in favour of changing the EU competition policy to ensure a level playing field. There is also a group of EU member states which want to address new challenges concerning digitalisation and servitisation through the industrial policy to facilitate the improvement of innovation. Moreover, some member states argue for reindustrialisation, as a process of supporting their traditional industries struggling with ambitious environmental and social goals. Of course, the aforementioned groups are not exclusive; some member states belong to two or three of them, which makes a discussion on the EU industrial policy more problematic. Nonetheless, a composition of different and/or conflicting objectives led the EU towards a debate on a comprehensive industrial strategy, which could be accepted by all, or at least the majority of member states.

However, it should be noted that the EU has no exclusive competence, not even any shared competence with member states, in industrial policy. The Treaty on the functioning of the European Union stipulates in article 173 that the Union and the member states will ensure that the conditions necessary for the competitiveness of the Union industry exist. Their actions should be aimed at: a) speeding up the adjustment of industry to structural changes, b) encouraging an environment favourable to initiative and develop undertakings throughout the Union, particularly small and medium-sized companies, as well as to cooperation between them, c) fostering better exploitation of the industrial potential of innovation, research and technological development policies. Apart from an undefined method of cooperation among member states, the Treaty provides that the Commission may take any useful initiative to promote such a cooperation, while the European Parliament should be informed about it. It is worth noting that the above mentioned initiatives should not provide any basis for the introduction of measures which could lead to a distortion of competition or contain tax provisions or provisions relating to the rights and interest of the employed persons (Treaty, 2012).

In view of the aforementioned remarks and recent challenges or opportunities faced by the EU, the paper is aimed at finding and evaluating common and conflicting interests of Poland and Germany, as two countries having different needs but looking for common solutions, towards a new industrial policy of the EU. To this end, we set the scene by analysing some statistics on the position of industry, including manufacturing and selected industry-related services in the German and Polish economy in terms of GDP and employment as compared to the EU average. Moreover, we shed some light on changes in state aid objectives offered in both countries. Then, we analyse programming political documents elaborated in the EU as well as at the national level, bilateral and multilateral declarations of EU member states. We decided to focus only on the issues concerning the relationship between competition policy and industrial policy. Taking into account the fact that the

Eurojargon is often ambiguous, in order to ensure clarity, thematic unity, precision, and a proper presentation of various approaches to industrial policy, the analysis uses original statements, phrases and quotations from the original documents, supplemented by the author's own critical remarks and opinions.

The position of manufacturing in the German and Polish economy

A servitisation process was one of those which was reinforced and sped up in the European Union during the crisis period (Ambroziak, 2017b) and did not allow the EU industry to come back to its position from before 2008 in nominal values. It pushed manufacturers to offer their goods in tandem with services to gain competitive advantage over third country competitors. It allowed them to shift towards new business models, to make a step to meet consumer expectations, who shifted their needs from ownership to usership, which launched a transformation of economy of ownership towards the economy of access to transport, information, knowledge – broadly speaking services.

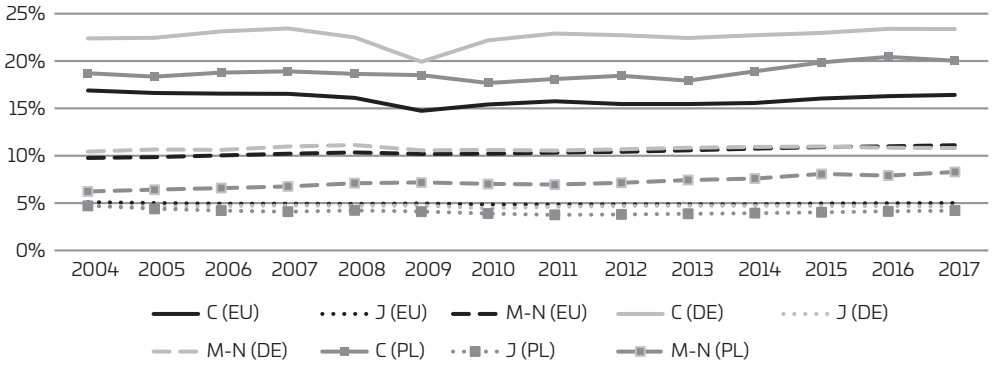
Moreover, we should bear in mind that unit production costs of goods have decreased over the last decade due to automation, robotisation and digitalisation of production processes, while costs of intangible assets have dramatically increased. The latter were profoundly related to and derived from innovative services strongly supported by consumer needs and behaviours. In consequence, there are not economic reasons to expect that a share of manufacturing in value added composition would increase dramatically in the coming years, in opposition to what one can expect that it will decrease in favour of the service sector.

According to Eurostat database, a share of manufacturing in the EU value added declined from 16.9% in 2004 to 14.7% in 2014 and slowly rose to 16.4% in 2017 (Figure 1). Although this decrease was compensated by an increase, it should be noted that the EU is not a homogeneous economic entity, and consists of countries with lower and much higher industrial intensity. The latter are represented by Germany, who recorded in the above mentioned years respectively 22.4%, 19.9% and 23.4%. A slightly different path of industrial growth was observed in Poland, where it oscillated between 17.7% and 18.9, while only after 2014 it recorded a slow increase up to a little over 20%. Thus, one can state that both German and Polish industry retained their strong positions in their economy, above the EU average for the period of 2004–2017.

At the same time, it is worth noting that their service sector did not expand as it happened in other member states. The service sector consists of many industries, which should be taken into consideration during the evaluation of industrial position of EU member states. As we took into account industry-related services, we focused on: a) professional, scientific, administrative and support service activities and b) information and communi-

cation. Poland noted higher dynamics in the increase in the share of professional, science and administrative services in GVA as compared to Germany and the EU, however it was still below their nominal values. At the same time, Poland and Germany recorded the shares of information and technology services in value added below the EU average. It shows that, as Germany shifted its position to a stronger economy based on industry and industry-related services with an increasing position of communication technologies, Poland did not record substantial changes in the aforementioned components of its economy.

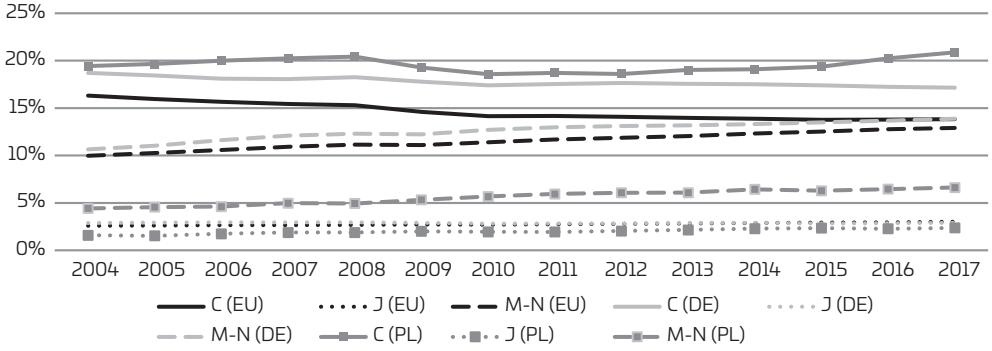
Figure 1. Share of manufacturing and selected industry-related services in value added of the EU, Germany and Poland in 2004–2017



C: Manufacturing, M-N: Professional, scientific and technical activities; administrative and support service activities, J – Information and communication

Source: Eurostat.

Figure 2. Share of manufacturing and selected industry-related services in employment in the EU, Germany and Poland in 2004–2017

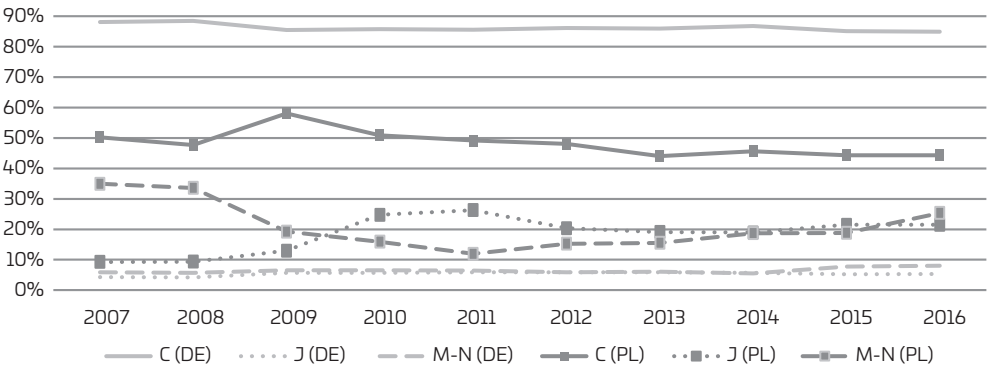


C: Manufacturing, M-N: Professional, scientific and technical activities; administrative and support service activities, J – Information and communication

Source: Eurostat.

A slightly different situation of the Polish industry can be observed while analysing the share of manufacturing and selected industry-related services in employment in 2004–2017 (Figure 2). In this field, Poland was the leader and in the last few years increased a share of employment in manufacturing in total employment, while both Germany and the EU decreased it. Taking this into account, as well the fact that Germany and the EU increased their manufacturing contribution to GVA, we can state that they shift towards a more capital-intensive industry, while Poland a towards labour-intensive sector. In contradiction to this, the EU, as a whole, including Germany recorded a rise in shares of their industry-related services, while Poland, although followed them in this positive tendency, remained in a lagging position and noted a lower rise dynamics.

Figure 3. Share of manufacturing and selected industry services in expenditure on R&D in total business expenditures in Germany and Poland in 2007–2016



C: Manufacturing, M-N: Professional, scientific and technical activities; administrative and support service activities, J – Information and communication

Source: Eurostat.

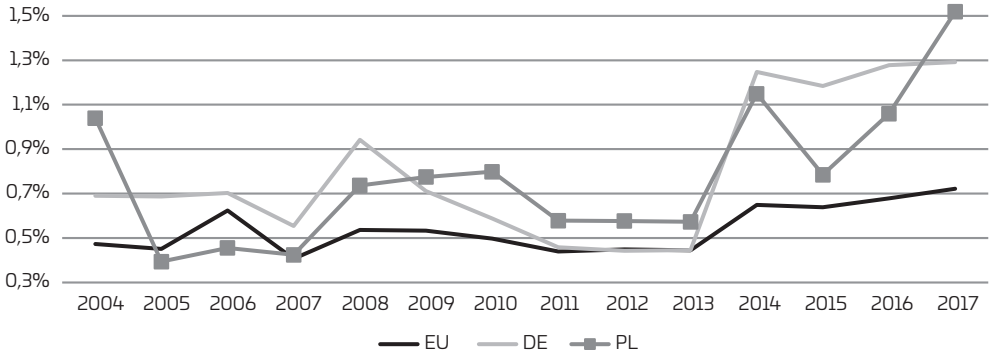
There is no doubt that in recent years economic competitiveness has depended on new technologies and innovation worked out by research and development activities, which need substantial finances. The highest share in total business expenditure on R&D was recorded in the German industry (over 85% in 2016), followed by the Polish industry (decrease to 44.3% in 2016) and Polish industry-related service sectors, including telecommunication and information. Thus, the innovativeness of the German economy is based on industry, while in Poland on the service sector. It means that both countries have different approaches to the development of economy: Germany still concentrates on manufacturing, Poland develops its position by supporting R&D in industry-related services.

One of the most sensitive instruments of industrial policy which can be introduced by the governments of EU member states is their state aid. As public intervention in a free

market can disturb competition, it is prohibited by the Treaty on the functioning of the EU with some exceptions under several conditions worked out by the Commission. In consequence, we can break down state aid granted legally to entrepreneurs into some groups, whose importance in relation to the total public aid evolved dramatically in the EU member states in the last decade.

In the year of accession to the EU, Poland still recorded a relatively high percentage of state aid as compared to GDP due to the finalisation of restructuring processes of traditional sectors of economy (Figure 4). Nonetheless, in consecutive years, Poland recorded a lower intensity of financial interventions, then an increase, as projects financed by structural funds were launched. In the last years 2015–2017, there is an important rise in the state aid in the Polish economy up to over 1.5% of GDP. As regards Germany we can observe some similarities to tendencies recorded in Poland in terms of value and directions of changes. At the same time, other member states reduced their intervention in the market; and the EU average intensity of state aid in relation to GDP as well as the dynamics of changes were lower than in both Poland and Germany.

Figure 4. Relation of state aid to GDP in 2004–2017

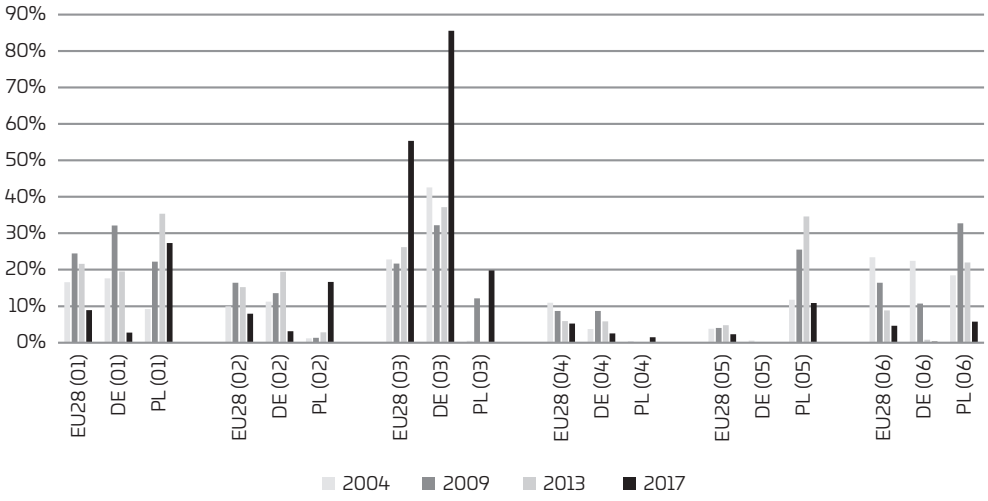


Source: Eurostat.

The structure of state aid divided into its objectives/categories is much more important than the value. For over a decade, the state aid for environmental protection and energy saving has increased its position in the total public interventions in the EU, including European funds granted to entrepreneurs (Figure 5). The highest jump up can be observed particularly in the last 4–5 years, when climate changes were put on top of the EU agenda. This tendency was followed by many member states, including Germany and, to a certain extent, Poland. However, it should be noted that in the case of the latter the importance of this category is three times lower than in Germany. Conversely, Poland recorded the highest and still increasing share of regional state aid dedicated to new investments, as its role

in the EU, including Germany, significantly decreased. It should support lagging regions in attracting new investors, so that they would not require any additional conditions concerning, for example, innovative production or, at least, energy efficient production projects. An interesting situation can be observed in the state aid to R&D&I. As it retained its important role till 2013, the last 4–5 years revealed its much lower share in total state aid in Germany (and the EU as well), while in Poland this category of public intervention increased. It means that, the EU as a whole, including Germany, shifted their financial intervention from general subsidies to entrepreneurs, including those for R&D, towards objectives giving rise to a real aid to ensure competitiveness at the world level in the area of climate issues. Conversely, Poland focused on regular investments in fixed assets in less developed regions or subsidies to R&D activities, whose adequacy, request and demand were hard to be properly verified by the government.

Figure 5. Shares of selected state aid objectives in total state aid in 2004–2017



01 – Regional development
02 – Research, development and innovation
03 – Environmental protection and energy saving
04 – Small and medium-sized enterprises
05 – Employment
06 – Sectoral development

Source: Eurostat.

Political context of the new EU industrial policy

A new approach towards industrial policy was launched by the former President of the European Commission of 2014–2019 in his "Political Guidelines". He linked two policies: the Single Market policy and industrial policy by reinforcing a strong and high-performing industrial base for the EU internal market. It is worth noting that in 2014 the President-elect of the European Commission did not recognise services as a innovative tool for re-industrialisation in Europe, as he argued that it would be naïve to believe that growth in Europe could be built on the basis of service alone. Therefore, he insisted on bringing the industry burden in the EU GDP back to 20% by 2020, from less than 16% in 2014 (Junker, 2014). It is worth noting that both member states, Poland and Germany noted much higher shares than 20% in 2014.

In December 2016, the European Council decided to call on the Council and the Commission to evaluate the impact of mainstreaming industrial policy on the EU strategic initiatives and to consider concrete actions to strengthen and modernise the industrial base of the Single Market (European Council, 2016). The former request resulted from the fact that the EU introduced many new sectoral regulations and directives, which had an important impact on industrial competitiveness. The latter inquiry resulted from the lack of instruments or steps proposed by the Commission.

In response, the May 2017 Competitiveness Council repeated the opinion on the essential role of industry as a major driver of growth, employment and innovation in Europe. It is worth noting that, on the one hand, the Council recognised that a holistic industrial policy approach based on integrated value chains, inter-clustering linkages and activities was crucial, however, at this same time it mentioned that the approach should include, when necessary, sectorial initiatives for sectors facing economic change and high growth potential sectors. That was a very good example of an effect of seeking for a well-balanced compromise text, which could be accepted by all member states. Finally, the Council called on the Commission to provide a holistic EU industrial policy strategy for the future in time. It should present medium to long term strategic objectives for industry and be included in the framework of the Commission's 2018 work programme (Council 2017a). This approach was supported by the June 2017 European Council which repeated its conclusions from a year ago (European Council, 2017).

The aforementioned political calls resulted in the European Commission communication on a renewed EU Industrial Policy Strategy. It stipulated that a new holistic approach should be based on six dimensions: single market, digitalisation, circular and low carbon economy, investment, innovation and international cooperation. The Commission observed that the implementation of that strategy would require a joint commitment and systematic

efforts on the part of industry as well as all relevant EU, national and regional stakeholders (European Commission, 2017a). That approach was particularly important to Poland, as it could suggest allowing European funds to support industrial development in lagging regions. Nonetheless, the document issued by the Commission did not include any concrete actions, apart from those well known and repeated many times at the highest political level. It is worth underlining that the aforementioned document was a collection of initiatives launched already by the Commission, which directly or indirectly impacted the EU industry. Unfortunately, it was not a strategy, with properly formulated objectives, available tools and indices, based on which further development could be evaluated (Ambroziak, 2020).

Therefore, although the December 2017 Competitiveness Council welcomed the Commission communication as an important signal and a useful first step towards developing a future-oriented EU industrial strategy, it repeated its request concerning a comprehensive EU industrial strategy, adding a time perspective of 2030. Moreover, it invited the Commission to consider a concrete mechanism to effectively monitor the implementation of the strategy (Council, 2017b). That inquiry was repeated by the November 2018 Competitiveness Council, which called for a comprehensive and long-term industrial policy strategy for the EU, including an action plan and set a deadline of the beginning of a new EU institutional cycle (Council, 2018).

The aforementioned initiatives and political statements of EU institutions, agreed on in 2016–2018, introduced no changes to the concept of the EU industrial policy. It is worth noting that even the crisis period of 2008–2010 did not have enough powerful impact on the European agenda in this field. Therefore, one of the leading promoter of industrial policy – France – established an informal EU member states group of "Friends of Industry" in 2013. The group did not consist of permanent members representing all EU member states, and each meeting included various countries (although the core is usually – but not always – stable with France, Germany, Spain, Italy and Poland (Ambroziak, 2014)). In 2018, facing no substantial steps taken by the European Commission or by the Council, France organised the eighth meeting of "Friends of Industry". In their joint, the statement EU member states diagnosed a source of problems in the EU industry: i) increasing fierce competition from other major economies, which conduct their own proactive industrial policy, ii) increasingly protectionist trade actions from third countries (Friends of Industry, 2018).

The "Friends of Industry" group based its narrative on more fear and anxiety, pointing to an enemy outside the EU rather than to the problems of European industry arising from the existing policy. In order to get a broader acceptance from cohesion of member states with their concept, the "Friends of Industry" group argued that the industrial strategy should take into account the needs for reindustrialisation and the differences in the industrial base development among member states. Therefore, it should offer instruments tailored to the needs of regions and industries. The Group agreed upon an assertive industrial policy based

on four actions: a) the Commission should present an ambitious and comprehensive industrial strategy up to 2030, b) strategic value chains should be identified, c) action plans based on competition, research and innovation, digital, defence, the Single Market policies as well as on financial instruments, including the next Multiannual Financial Framework should be developed, d) the role of the Competitiveness Council should be strengthened within the EU institutional framework (Friends of Industry, 2018).

It is worth noting that on the margin of the meeting of group of "Friends of Industry" in December 2018, ministers for economic affairs from Germany and France discussed their further cooperation. It resulted in common, more detailed plans on the crucial issues concerning the industrial development of both countries, especially in the field of battery cell production, disruptive innovation and artificial intelligence (Franco-German press release, 2018). It showed that France and Germany sought a broad political agreement on their plans, firstly, at the European level, however as they did not convince all member states, they put their bilateral cooperation visions in general outcomes of the "Friends of Industry" discussion. The next strong political commitment to economic cooperation between Germany and France was the Aachen Treaty of January 2019. Both parties agreed to complete the single market and work towards a competitive Union with a strong industrial base as a foundation for prosperity, promoting economic, fiscal and social convergence as well as sustainability in all its dimensions (Aachen Treaty, 2019).

The above mentioned political steps were taken within the "escape forward strategy" by Germany and France before February 6th, 2019, when the European Commission made a negative decision on the merger of two companies Siemens and Alstom. According to the Commission, the proposed merger would have harmed competition in markets for railway signalling systems and very high-speed trains. The merger would have create the undisputed market leader in some signalling markets (including railways and urban/metro lines) and a dominant player in very high-speed trains. (European Commission, 2019a).

Of course, the governments of both countries did not agree with the Commission decision. Therefore, already one day before this decision was announced, Germany presented its "National Industrial Strategy for 2030" (NIS, 2019). The main objectives of the strategy (NIS) were defined as: a) securing and regaining economic power and technological competitiveness, b) ensuring job creation and prosperity of all citizens, c) increasing the share of industry in GVA to 25 per cent in Germany and 20 per cent in the EU by 2030, d) making a long term contribution to the development of a global social market economy. There was one more goal, which was not a real objective, but a choice of an instrument to achieve the aforementioned aims: state interventions, although with some exceptions and derogations. It should be underlined that the document was a novelty in the German economic policy, as it could be recognised as a negation of the current social market economy approach. As previously Germany refrained from active financial intervention in the market, the NIS point-

ed out that state activity may be necessary to avoid serious disadvantages for the economy. Moreover, if the market forces cannot retain its innovative strength and competitiveness, then, according to the NSI, the government should be entitled to intervene. It means that such public interventions could be taken on the basis of reasons not necessarily resulting from the real market forces but rather political willingness. Finally, the NSI stipulates that value added chains should be closed from the production of basic materials, to finishing and processing, to distribution, services, research and development. It means that European companies should introduce both processes: in-sourcing and on-shoring, which could be very costly and counterproductive for the growing competitiveness of European economy.

Two weeks after the European Commission's negative decision on the merger of two giants from Germany and France, both countries signed a manifesto for a European industrial policy. The future strategy should consist of three following pillars: a) investment in innovation, b) adaptation of regulatory framework to new challenges and opportunities, especially in the field of state aid and merger law to tackle competition from third countries, c) introduction of protectionist measures against competitors from outside the EU (Manifesto, 2019). That was a clear opposition to the current orthodox policy of the European Commission in relation to competition policy and the openness of the European Union.

The presented political documents provoked the President of the European Council to repeat the EU approach towards industry. In March 2019, the European Council only slightly modified its position and supported assertive industrial policy allowing the EU to retain the industrial power. The heads of governments and states did not want to decide on the future industrial policy without any reliable analyses; therefore, they called the European Commission to present, by the end of 2019, a long-term vision of the EU industrial future, with concrete measures to implement it (European Council, 2019a). These requests were formulated in greater detail and with more precise deadlines in comparison to previous statements. Nonetheless, it is hard to say that over two years political actions taken by Germany and France resulted in more concrete decisions of heads of states and governments.

After the German-French Manifesto, the German National Industrial Strategy, the European Council conclusions, which did not follow the German concept of European industry, Germany decided to convince other selected countries, in particularly Poland, to their vision. In consequence, Germany and Poland signed a joint declaration of March 2019. The majority of topics raised in the document were derived from the German National Industrial Strategy, as well as Franco-German Manifesto, however there were, obviously, only those which could be accepted by Poland. As in the previous German documents, both countries called for an ambitious EU industry strategy with clear objectives till 2030 and instruments tailored to the needs of industry and specificities of the member states. The latter expression was a nod to Poland, which always underlined its specificities, especially in the climate change topic. Germany and Poland presented 5 main fields of activities, where they found

a common interest: a) invest in innovation and critical skills, b) define common strategic goals of industrial policy to address the digital transformation, sustainable mobility, bioeconomy, green technologies, the sustainable raw materials supply, low carbon/low greenhouse gas emissions and securing a sufficient supply of skilled labour, c) support strategic technologies, d) improve EU and national framework conditions concerning the EU Single Market, digitalisation, and CO2 mitigation, e) promote an ambitious EU trade policy (German-Polish Declaration, 2019).

In May 2019, the Competitiveness Council, as a follow up to the previous political decisions at the EU level, adopted conclusions which repeated, after the European Council that there was an urgent need for a long term Industrial Policy Strategy meant to help the European industry compete with third countries (Council, 2019). It underlined that the strategy should include an indicator framework regarding industrial competitiveness and complete or update, where necessary, the strategy by targeted sectoral actions in order to adopt it to recent and future foreseeable technological developments and challenges. This statement shows that there were, at least, two groups of member states: those supporting a horizontal industrial policy as a supplement to the open Single European Market and those opting for sectoral approach due to structural problems in their traditional industries. Nonetheless, it is worth noting that the conclusions, in contradiction to the Franco-German approach, reaffirmed the need for a fair competition within the Single Market, for the growth-friendly regulatory environment as well as for the strengthening of the EU industry competitiveness and advancing the Single Market integration so as to enable the EU industry to compete globally on a level playing field (Council, 2019).

Due to an extended discussion on the EU Industrial Policy, in June 2019, Poland presented its official position on it to join the work on "A New Strategic Agenda" for the coming new European Commission. The Polish document was based on the assumption for the foundation of the EU long term productivity growth (MET, 2019). It means that Poland focused on improving effectiveness of production factors, while the EU institutions decided to target their actions towards climate changes and social mobility as the most important challenges.

Finally, in June 2019, the heads of states and governments adopted "A New Strategic Agenda 2019–2024" for the coming 5 years. It confirmed that a strong economic base is of key importance for Europe's competitiveness, prosperity and role on the global stage. To this end, the European Council underlined a need for a more integrated approach connecting all relevant policies and dimensions, including deepening and strengthening the Single Market and designing an industrial policy fit for the future. As regards unfair third country competition, the strategy fosters ensuring a level playing field: fair competition within the EU and on the global stage, promoting market access, fighting unfair practices and securing risks from third countries as well as strategic supply chains (European Council, 2019b).

On the basis of this, one can formulate some fields of activities of the future EU Industrial Strategy: the EU Single Market, competition policy focused on building advantage against third country competitors and creating strategic European value chains.

Internal market in the EU industrial policy

The Single European Market was established over 26 years ago, however, there are still many shortcomings which should be addressed by the EU law. Nonetheless, the Commission, pointed out in its Communication of 2017, that the EU Internal Market should facilitate the integration of European companies in the global value chains and act as an essential driver of industrial competitiveness (European Commission, 2017a). This approach was adopted by the Council, which also recognised interrelated industry and Single Market policies was crucial for the global competitiveness of the EU. Ministers responsible for competitiveness made some progress in this field, as they highlighted the importance of services within the Single Market, which should provide the framework conditions for European industry, especially SMEs, to take advantage of it and exploit its opportunities (Council, 2017). This view was supported by the heads of states and governments, who said that to reap the maximum benefits of the Single Market, the EU needs a strong industrial policy (European Council, 2018a). For the next a few months this issue was not on top of the EU agenda, as in December 2018 the European Council focused only on the Single Market underlining its impact on the citizen welfare, inclusive growth and job creation as well as on investment and global competitiveness (European Council, 2018b).

As regards Germany, its Strategy (NIS, 20190) was relatively modest on the EU internal market. However, Poland's position on a relationship between the EU Single Market and industrial policy was much more detailed. It suggested, first of all, the adoption of an integrated approach to the Single Market through introduction of uniform EU solutions based on regulations or full harmonisation, strengthening interdependence between the service and industry, taking into account the horizontal nature of the digitalisation of the economy and further development of liberalisation within the EU to strengthen the external competitiveness. Eventually, Poland suggested identification and elimination of existing barriers as well the monitoring of application of new regulations to avoid an introduction of new burdens (MFA, 2019).

In recent conclusions on the industrial strategy, the May 2019 Competitiveness Council stressed that a strong and well-functioning Single Market, including services, provides the necessary framework conditions and is essential for European industry and enables European businesses to scale up and to compete successfully in the global market. To this end, according to the Council, all rules should be properly, timely, effectively and transparently

implemented and applied within the Single Market. Moreover, it called for preventing and removing unnecessary regulatory and non-regulatory burdens and all unjustified remaining technical and non-technical barriers (Council, 2019).

As regards the future of the European Union, the European Council agreed that the EU cannot underutilise the potential of the Single Market, particularly in the area of services (European Council, 2019b). This approach should go in tandem with a more assertive, comprehensive and coordinated industrial policy. The latter is both a repetition of the previous European Council conclusions of March 2019 and a supplement of the issue of how to conduct the EU industrial policy.

In order to meet the European Council requests concerning strengthening the Single Market, the European Commission issued some very important drafts to complete free movement of goods as well as at least to make some progress in the liberalisation of provision of services (Stefaniak and Ambroziak, 2017). As regards trade in services, the European Commission had two important initiatives for service sector: service e-card (European Commission, 2017b, 2017c) and enhancement of notification procedure under the Service Directive of 2006 (European Commission, 2017d).

Contrary to the elimination of technical barriers in trade in goods (Regulation 2019/515), burdens to service companies were not even slightly reduced. Both the Council and the European Parliament did not agree to eliminate administrative barriers, introduce transparency in national requirements applied to cross-border service providers and allow the Commission to asses and block regulatory measures affecting services proposed by member states. Both initiatives were strongly supported by the majority of EU-13, including Poland, as well as Scandinavian countries and the United Kingdom. The leading sceptics about reduction of administrative burdens, were EU-15 countries, including Germany. They claimed that the country of origin principle would be introduced through the back door, and social rights would be broken. Neither argument was true, as the aforementioned drafts concerning service e-card provided for the introduction of a new electronic procedure facilitating trans-border service providers to meet the existing administrative and social national requirements, allowed by the Service Directive of 2006. As regards a notification directive, it could introduce transparency in national measures applied in some service sectors.

Therefore, it is worth noting, that although the Competitiveness Council in May 2017 pointed out a need for further streamlining of legislation and removing unnecessary, discriminatory or disproportionate regulatory barriers in order to improve the functioning of the internal market and to stimulate a more growth-friendly regulatory environment for industry (Council, 2017a), drafts on the elimination of administrative barriers in service sector were not accepted by both the Council and the European Parliament. It is even more important, as the European Council, in December 2018 invited the European Parliament and the Council to agree, before the end of the term, on as many of the pending propos-

als relevant to the Single Market as possible. Moreover, the heads of states or governments agreed on the importance of removing remaining unjustified barriers, in particular in the field of service, as well as preventing any new barriers and any risk of fragmentation (European Council, 2018b). Therefore, after the big failure of both legislative proposals in the EU decision making-process, which was in contradiction to recent political statements, the May 2019 European Council underlined that short-term difficulties could not be invoked as an argument against a long-term strategy, which is bold (European Council, 2019b). It means that temporary problems in the market should not be used to limit further integration, including the industrial one.

Competition policy for the EU industry

A competition policy deals with two spheres of industrial activities: actions taken by entrepreneurs in the form of abusing the dominant position and concluding agreement distorting competition as well as governmental financial interventions in the form of state aid. The aforementioned activities are prohibited due to the fact that they may disturb competition within the EU Single Market. To ensure that the Treaty rules are applied by both enterprises and governments, the EU has an exclusive competence in that field and the Commission, first of all, should be informed about all cases of mergers as well as state aid, which can have an impact on trade among member states. Secondly, it has to issue a decision on conformity or no conformity in relation to a proposed action with the EU internal market principle. It means that companies and governments are limited in their activities, which has been contested recently by some member states, especially France and Germany, after a negative decision of the Commission on acquisition Alstom by Siemens, as well selected member states (except for Scandinavians, the UK and Netherlands), who could not give more state aid during and after the crisis of 2008–2010.

As the Commission expressed in its Communication of 2017, the EU competition policy is an important driver for firms to innovate and invest. It ensures that firms can source their inputs at optimum conditions and benefit from competitive outlets for their products, leading in general to a better use of society's resources (European Commission, 2017a). The French fight against the EU competition policy is not anything new (Ambroziak, 2014); however, nowadays more countries, including Germany, support France's position. In the bilateral Manifesto, Germany and France stated that competition rules are essential, however, the existing rules need to be revised to ensure that European companies can compete on the world stage. As a reason for changes, they observed that of the top 40 biggest companies in the world only 5 are European. France and Germany accused the lack of regulatory global level playing field for this situation (Manifesto, 2019). It means that they would like

to adjust competition rules within the EU Single Market to be able to intervene in order to increase competitiveness of their companies at the global level. However, the problem is that any artificial improvement of competitiveness of a company against a third country competitor limits competition within the EU and worsens the position of other EU firms which were not supported by their governments.

It is worth noting that the European Council in its Strategic Agenda for the EU till 2024 also pointed out that the European competition framework should be updated, however due to the new technological and global market development, which was opposite to the French and German concept (European Council, 2019b).

As regards Poland, in its position paper, it emphsised the importance of matching the legal framework of the EU competition law, including state aid and merger law, with the changing reality. Poland indicated that the role of the state should be to promote the growth in entrepreneurs' awareness of the benefits of focusing their business on the use of knowledge. Therefore, the competition policy should consider the future changes of digitisation, and all changes in the EU law should not disturb competition within the EU (MET, 2019). It shows much more liberal and opportunity-based approach taken by Poland in comparison to German approach based on fear of competition from outside the EU.

Merger policy and European champions in the EU industrial policy

As regards antitrust policy, the negative decision of the European Commission of February 2019 on Siemen's proposal on acquisition of Alstom, fueled a discussion on the future competition policy in relation to third countries. The Commission argued that during its investigation it considered the competition landscape in the Rest of the world, especially from Chinese suppliers outside their home markets. It found that Chinese suppliers of signalling systems did not even try to participate in any tender, while Chinese manufacturers of trains would not represent a competitive constraint on European companies in a foreseeable future (European Commission, 2019a). In opposition to it, Germany and France claimed that the Commission did not take into consideration the position of Chinese industry and tendencies of their entering the EU. They also argued that in order to compete with companies outside the EU, which are often heavily subsidised or even state-owned, the EU had to allow for the establishment of the European champions and analyse their economic activities not only within the EU Single Market but globally – in the world.

Therefore, Germany, in its National Industrial Strategy claimed that the EU merger regulations must be reviewed and changed so that the international competition ostensibly remains possible for theirs and other European companies (NIS, 2019). It is a clear voice in favour of European big champions, who could relatively easily compete with compa-

nies from other big blocks in the world. Moreover, the signatories of the Franco-German Manifesto pointed out that the Commission should take into greater consideration the state-control and subsidies for undertakings and be more flexible when assessing relevant markets within the framework of merger control. They also insisted on a right of appeal of the Council, which could ultimately override the Commission decisions (Manifesto, 2019). As the former requests can find its reasoning, the latter would change a balance between the independent Commission, which has exclusive competences in the field of competition policy, including merger control, and political body – the Council, which consists of politicians – ministers.

As regards Poland, it underlined its openness towards a discussion on the European antitrust law to enable European enterprises to compete effectively in the international markets. Therefore, following the Franco-German Manifesto, Poland supported updating the definition of the relevant market by taking into consideration competition at the global level. The aforementioned support was justified by an assumption that it should help in assessing the concentration of entities integrating European value chain in the form of European champions. However, it should be underlined that they should differ from national champions in terms of the scale and transborder nature of their activities, while their aims should concentrate on the integration of start-ups network and building complex value chains (MET, 2019). It means that Poland suggested a slightly different approach as compared to Germany and France, as it proposed European champions outside competition within the European Single Market, while for both big countries it was not an issue. It seems that they could scarify competition within the EU to win a competition with unfair activities of companies from third countries.

State aid policy in the EU industrial policy

The EU state aid law has been under attack by some member states since the crisis of 2008–2010. In that period of time, the Commission decided to introduce some temporary regulations concerning the state aid to banking system, while provisions on financial public interventions were not changed dramatically (with the exception of a higher level of *de minimis* state aid) (Ambroziak, 2012).

Therefore, particularly France, demanded more flexible state aid rules to tackle economic problems at the national level. However, in consecutive years, as the EU faced a fierce third country competition, in particular China's, France began win support of other countries, which experienced a huge inflow of Chinese investments. One of them was Germany, which in its NSI defined a mechanism of a state aid, addressing a non-EU competition. It argued that where the state compensates for interventions due to high ranking political reasons

in terms of their damaging effects on competition, they should not be recognised as state aid but as restoring comparability in competition (NSI, 2019). It means that Germany proposed strictly political reasoning for governmental financial interventions launched to protect national companies. Moreover, the NSI listed areas, where such actions potentially can be needed: electricity and energy prices, corporate taxation and social security contributions. It is worth noting that the German document is inconsistent in this field: on the one hand, it underlines the principle of free market, freedom of entrepreneurs in their economic activities and no state intervention between individual companies, while on the other hand, it wants, as it has already been presented, to protect national companies against subsidies granted to third country firms, to facilitate subsidies in area of innovation to achieve competitiveness in the interest of the economy as a whole (NSI, 2019). Such an approach is definitely against the EU state aid rules which provide conditions for workable competition within the EU internal market, as a whole. Each national intervention in the market, made even due to unfair activities of third country companies, can easily distort competition within the EU internal market.

The new concept of state aid was developed in the Franco-German Manifesto. Both countries explained that some third countries heavily subsidised their own companies, while European firms were at a massive disadvantage due to the restrictive state aid rules. However, contrary to the German NSI, the signatories did not opt for state aid justified by political reasons, but called for changes in EU state aid rules to finance major research and innovation projects (Manifesto, 2019). It is worth noting that the following Competitiveness Council did not share this approach, while it highlighted only that compliance with the state aid control principles by third countries jurisdictions should be properly addressed and enhanced (Council, 2019). It means that instead of changing the EU state aid rules, the Council advocated implementing them in dedicated competition or trade agreements.

The above mentioned Franco-German position was partially repeated in the German-Polish Declaration of March 2019, as both countries expressed their opinion that in order to promote the competitiveness of EU industry at an international level, it might be necessary to discuss the possible evolution of the European rules applicable to competition and state aid (German-Polish Declaration, 2019). It seems that these requests were softer in comparison to German National Industrial Strategy, probably due to Poland's position. Poland, in its documents on the new industrial policy of the EU, agreed, as it was in the Franco-German Manifesto that there was a room for review of the existing legal framework for the EU state aid law to ensure that European companies have an effective capacity to compete in the global market. At the same time, Poland pointed out that the review should be aimed at the verification adequacy of the state aid rules in the light of the market failures theory, as well as effectiveness and clarity of measures.

It is worth noting that Poland focused its request on state aid to promote a level playing field in the specialised intangible goods markets. In Poland's opinion, the state aid for R&D should be a key intervention instrument in such areas as industrially organised educational institutions and science institutions, capable of incubating a large number of star-ups, scientific workers and business cooperation in the form of clusters and competence centres. As regards sectoral approach, on the one hand, Poland expressed its negative position against identifying specific technologies that would be supported, as they can very quickly change. However, on the other hand, it stated that enhanced support is particularly appropriate in the case of technologies with a flat learning curve and significant product market entry barriers, e.g. electronics, chemicals, biotechnology (MET, 2019).

It is also worth observing that after seventy years of restrictive rules and principles concerning state aid, when the Commission made state aid rules rather more limited than flexible, EU member states launched a political discussion on changes in that field. Interestingly, a division between two groups of countries which are in favour or against radical changes and reducing limitations of state aid is between old member states with traditional approach to industry and new member states and Scandinavian countries, which mostly benefit from the EU internal market and their price competitiveness.

Conclusions

The documents and conclusions issued by the EU institutions on the future of the EU industrial policy had to be adopted unanimously. Due to the fact that each presidency, at the level of the Commission as well as the President of the European Council did their best to ensure that the proposed conclusions are acceptable by all member states. In consequence, main thoughts and wording used in those papers were elegant, diplomatic, and often meaning nothing instead of something. Therefore, one can observe that a position of the EU, as a whole, towards a new industrial policy has evolved slowly with no substantial changes over the period under research. Nonetheless, we can observe that the EU retained its position in a horizontal rather than sectoral approach, focused on more holistic policy, including, in particular, the Single Market Policy as a base for reinforcing industrial sector, definitely strengthening its approach towards third country competitors, especially those who acted unfairly.

As all the aforementioned documents were adopted by the Council and the European Council both Germany and Poland accepted the main assumptions and proposed instruments. However, there was a parallel work of a political influence on the European agenda. Some member states expressed their opinions or even strong positions in joint bilateral, trilateral or multilateral declarations. A very good example of such a way of proceedings is the

aforementioned joint declaration of the "Friends of Industry" group as well as the agreement between Germany and Poland on a new EU industrial policy.

On the basis of our research, we can state that Germany and Poland strongly supported a change towards an ambitious and effective industrial policy. Both countries recorded a relatively high share of industry in their economies, although the Polish industrial sector is more labour-intensive than the German sector. However, Germany and Poland agreeably supported the assertive industrial policy. It seems that this is the end of common interests. Both member states requested a modernisation of the antitrust policy, however Germany had its well-documented experience in the negative European Commission decision, while Poland expected the Commission ruling on the merger of Orlen and Lotos (European Commission, 2019).

As regards the state aid, Germany opted for more flexible state aid rules due to unfair competition of third countries, which heavily subsidised their companies or even owned them, while Poland focused its willingness on the interventionism policy within research and development. Taking into account data concerning state aid granted in Germany and Poland, it can be said that Germany shifted their financial interventions from R&D towards energy saving and environmental protection. Therefore, a moderate German approach towards this category of state aid can result from its smart redirection from general innovation to innovation in the energy sector. Taking into account new initiatives concerning Important Projects of Common Interests, which engage Germany and Poland (Battery Alliance), it seems that they require further research.

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Conclusions

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International trade is based increasingly on distributing the value chain across borders. This volume analyses the nature and the challenges of this phenomenon looking at the case of the German-Polish economic relations. The economies of both countries are closely interconnected in the global as well as European value chains in various manufacturing activities.

Poland as a fast-growing country with attractive conditions for Foreign Direct Investment has significantly benefited from this process through the increase in exports, development of many sectors of economy and overall increase in labour and capital productivity. Yet, there are also concerns about this development. What happens if a foreign investor decides to relocate his activities to another country with lower production costs? Will Poland remain attractive only to low-skilled activities that add little value or can it move up the value chain to sustain and enhance prosperity?

The case studies in this book indicate that Germany's position as a dominant actor in the Central European production chains is far from permanent. Despite a significant ongoing asymmetry between the German Foreign Direct Investment in Poland and the Polish FDI in Germany, the latter nevertheless increased and in a number of cases prevented German companies from closure, in particular in the SME sector. Germany's export-oriented model with its focus on traditional manufacturing of capital goods itself has come under increasing pressure to remain internationally competitive in face of accelerating digitalisation, rising protectionism and a rapid catching up process pursued by emerging markets, in particular China. An unfavourable domestic institutional environment for productive entrepreneurship and the ultra-loose monetary policy of the European Central bank prevent Schumpeterian creative destruction and innovations. As a result, also the German-Polish trade is still dominated by the manufacturing sector, while innovative digital products are of marginal quantitative relevance.

Against this background in both countries and on the European level, there is an ongoing debate on what policy is best conducive to boost innovativeness and moving up the value chains. In this context, a new adequate GVC-oriented industrial policies are invoked.

However, to what extent it is really appropriate and if so, what exactly such a policy should look like, is an old controversial question. The answer to it depends much on the theoretical concept of the beholder. Nevertheless, two severe problems of a form of industrial policy are very difficult, if it is to be successful: the limited knowledge of political actors to identify profitable business opportunities or alleged market failure, and perverse political incentives that foster rent-seeking and regulatory capture by politically powerful groups. Therefore, the straightforward implication for the public policy is to limit itself to provide an overall innovation-friendly environment. It remains to be seen how technological progress itself, for example digitalisation, and exogenous shocks like the sudden closure of borders in the wake of the 2020 anti-coronavirus pandemic lockdown measures will affect the global value chains in general and the Polish-German economic coopetition in particular.

Participation in the global value chains and moving up these chains is of great importance for Polish enterprises and consequently for the Polish economy. The export-oriented economic development model adopted by Poland initially made use of Foreign Direct Investments as a source of technology transfers to domestic companies and potential link to global value chains. Nevertheless, simply opening up to foreign investors does not guarantee economic success for domestic economy and enterprises. Similarly, moving up value chains is neither obvious nor simple. Therefore, the purpose of this book is to answer the question of how the Polish economy and its enterprises can move-up global value chains, what factors determine it and what strategies – including economic policies – can be used to reinforce this process.

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