POLAND COMPETITIVENESS REPORT 2023

Focus on Entrepreneurship and Competitive Advantages

Edited by
Arkadiusz Michał Kowalski
Marzenna Anna Weresa

SGH Publishing House

POLAND COMPETITIVENESS REPORT 2023

Focus on Entrepreneurship and Competitive Advantages

POLAND COMPETITIVENESS REPORT 2023

Focus on Entrepreneurship and Competitive Advantages

Edited by
Arkadiusz Michał Kowalski
Marzenna Anna Weresa

SGH Publishing House

WARSAW 2023

Suggested citation
A.M. Kowalski, M.A. Weresa (Eds.) (2023). *Poland: Competitiveness Report 2023. Focus on Entrepreneurship and Competitive Advantages*. Warsaw: SGH Publishing House. DOI: 10.33119/978-83-8030-618-9.2023.

Reviewers
Joanna Bednarz
Marzena Frankowska

English translation
Ryszard Guz-Rudzki

Editor
Patrycja Czarnecka

First Edition

ISBN 978-83-8030-618-9
DOI 10.33119/978-83-8030-618-9.2023

SGH Publishing House
162 Niepodległości Ave., 02-554 Warsaw, Poland
www.wydawnictwo.sgh.waw.pl
e-mail: wydawnictwo@sgh.waw.pl

Cover design and production
Magdalena Limbach

DTP
DM Quadro

Print and binding
volumina.pl Sp. z o.o.
ul. Ks. Witolda 7–9
71–063 Szczecin
tel. 91 812 09 08
e-mail: druk@volumina.pl

Order 84/VI/23

Contents

Preface

Marzenna Anna Weresa, Arkadiusz Michał Kowalski

Competitiveness is a complex and multifaceted concept that inspires various types of economic research that lead to discovering new determinants of socio-economic development and the relations between them. In the era of widespread use of the internet and electronic access to many sources of information and knowledge, it is worth checking how commonly this term is used. In a matter of seconds, the search engine retrieves more than 1.3 million sources in Polish, where the concept of competitiveness appears, and the search for the English word "competitiveness" yielded more than 183 million hits. Therefore, is there anything new to be said about competitiveness? The authors of this monograph take up this challenge by dealing with entrepreneurship and its relationship with the competitiveness of economies. Why are entrepreneurship and related initiatives particularly important for competitiveness? Among other things, because they lead both to the creation of new firms and to increased productivity, which has traditionally been considered a manifestation of the competitiveness of nations [Porter, 1990]. However, there are many other issues that are analyzed in more detail in this monograph. The goal of this monograph with regard to theory is to broaden knowledge about entrepreneurship as a factor of the competitiveness of economies and to identify the directions of research on competitiveness, which emerged in the literature in response to new challenges of the 21st century, including the climate crisis, the COVID-19 pandemic, or demographic changes. The empirical analyses aim to determine the current competitive position of the Polish economy vis-à-vis other European Union countries and its changes over the period 2015–2022, taking into account the role of entrepreneurship for the development of competitive advantages, including the formation of start-ups. The achievement of these goals is supported by the following sub-goals, which are as follows:

- to present the theoretical background of the issue of international competitiveness, taking into account the latest scientific developments;
- to identify the international competitive position of Poland compared to selected countries;

- to identify and assess the importance of the factors crucial to the competitive ability of the Polish economy, as well as their analysis in terms of linkages with entrepreneurship;
- to determine the trends in entrepreneurship development in Poland, with particular emphasis on new business formation, technological entrepreneurship, innovation, and clusters.

The monograph consists of three parts divided into chapters. The first part (Chapters 1–2) outlines the theoretical background and introduces the concept of competitiveness, its determinants, including digitalization, sustainability, and entrepreneurship, taking into account the role of start-ups. The importance and multidimensionality of both concepts and different approaches to defining these terms are emphasized. It is also demonstrated that research at any level, whether focused on the firm (microeconomic), clusters (mesoeconomic) or the national economy (macroeconomic), leads to the conclusion that there is a strong and at the same time very complex relationship between entrepreneurship and competitiveness.

The second part (Chapters 3–6) looks at the competitive position of Poland compared to other European Union countries, using various economic and social indicators and taking into account the convergence of GDP per capita. The current condition of the economy is assessed, using the so-called pentagons of competitiveness to perform a comparative analysis of countries on the basis of five commonly used variables reflecting the state of the economy: economic growth rate, unemployment rate, inflation rate, and general government balance as well as foreign trade balance, both related to GDP. Also the conditions and prospects for the development of entrepreneurship in Poland are presented vis-à-vis the European Union, the activity of foreign capital in Poland and Polish capital abroad is discussed, and the analysis of the total factor productivity is conducted using growth accounting.

The third part (Chapters 7–10) is devoted to the main factors of competitiveness, analyzed through the lens of entrepreneurship. The results of research on capital resources and their role for the development of entrepreneurship, as well as workforce availability and skills and entrepreneurial attitudes in the labor market are presented. The strengths and weaknesses of the Polish innovation system are identified, including readiness of Polish enterprises for digital transformation, technological entrepreneurship and the role of clusters as factors of innovative activity of business entities are also studied. This broad picture of Poland's competitiveness is supplemented with comments on cultural determinants of entrepreneurship development.

The monograph closes with the most important conclusions arising from the analyses performed and indicates the directions of further research on this multidimensional issue.

The authors hope that the monograph will provide an inspiration for further discussion on shaping the competitiveness of economies, its traditional and new factors, as well as the role of entrepreneurship in this process.

Bibliography

Porter, M.E. (1990). *The Competitive Advantage of Nations*. New York: Free Press.

Part I

Competitiveness and Entrepreneurship: Theoretical Background

Chapter 1

Definition and Factors of Competitiveness: A Review of the Scientific Literature

Marzenna Anna Weresa

1.1. Introduction

The concept of competitiveness became the subject of wider scientific analysis in the latter part of the 20th century, but a coherent and comprehensive theory of competitiveness is yet to be developed, as the concept has many meanings and levels of analysis. The literature on the subject offers a variety of definitions, approaches and interpretations of this complex phenomenon and makes attempts to design competitiveness indicators, including synthetic metrics. In view of the abundant literature and over forty years of research on competitiveness, is it possible to add any new elements to the definition of this concept? How to understand competitiveness in the era of rapid development of technology, digital revolution, and social changes? To what extent have the determinants of competitiveness changed in the new environment? These questions are asked by scientists, entrepreneurs, and politicians. This chapter also seeks answers to these questions.

To start with, it worth noting that competitiveness can be considered at different levels of analysis, as its actors can be companies, industries, sectors, countries, as well as supranational areas. In its broadest sense, the concept of competitiveness can refer to:

- products and enterprises (microeconomic approach);
- sectors and industries (mesoeconomic approach);
- regions and urban agglomerations (mesoeconomic approach);
- national economies (macroeconomic approach);
- international economic groupings (mega-economic approach).

In this chapter, competitiveness is discussed in macroeconomic terms (competitiveness of the economy), but it is worth noting that all levels of analysis overlap, as the individual elements addressed by competitiveness research (enterprises, industries, regions, etc.) interact with each other. Competitiveness involves competing in product markets, factor markets, financial markets, or in the institutional domain.

This means that competitiveness (regardless of whether it is dealt with in micro, meso, macro, or mega terms) should be considered in comparison with other entities of a similar nature.

1.2. Definition of economic competitiveness – from productivity to sustainable business, prosperity, and resilience to crises

Traditionally, the understanding of the competitiveness of economies derives from the concept proposed by Michael Porter in his book *The Competitiveness of Nations*, who defined competitiveness through the lens of productivity changes [Porter, 1990]. A modified approach to this definition is to focus on the volume of production per person of working age, which is closely related to the quality of conditions for doing business. So defined, the concept was branded "foundational competitiveness" [Delgado, Ketels, Porter, Stern, 2012].

A broader definition of competitiveness refers to wealth creation [Aiginger, 2006], or the ability to sell products made in a country on international markets or to attract high-quality resources [Misala, 2014]. This corresponds with the traditional dimensions of competitiveness, which were characterized in several previous editions of this monograph: income competitiveness, investment competitiveness or competitiveness in international trade [Kowalski, 2022; Weresa, 2022]. However, this approach does not cover the complexity of the modern world and has proven insufficient [Aiginger, Vogel, 2015; Kowalski, Weresa, 2019, 2022]. New challenges related to the negative effects of climate change, environmental degradation [Kirjavainen, Saukkonen, 2020], as well as the rapid development of technology and digital transformation, and finally crisis situations (such as pandemics and wars), have reoriented the discussion on the competitiveness of economies towards its new dimensions geared to fostering technological development, environmental and social sustainability, including public confidence and social relations or resilience to crises [Kowalski, Weresa, 2019, 2021; Weresa, 2022].

The concept of institutional competitiveness and even that of competition state also appears in research on the competitiveness of economies [Pedersen, 2010]. These concepts are similar but not identical. The first concept means the ability of a nation to build institutional order and to shape political, social, and cultural institutions that drive socio-economic success in comparison to other countries. The second concept, i.e., the competition state, means governance arrangements that activate domestic resources and enable the national production base to gain comparative advantages

in an open economy [Pedersen, 2010]. It can be an alternative to the traditional welfare state [Hausner, 2013].

Studying the importance of institutional factors and entrepreneurship, which is the main theme of this monograph, the concept of entrepreneurial competitiveness used by some authors must not be overlooked [Prasetyo, Setyadharma, Kistanti, 2021]. It refers to the development of a new product in the context of achieving sustainable competitiveness. According to the authors, the key role in this process is played by institutions, which affect the development of entrepreneurship and the creation of new products (innovations).

Regardless of the dimension adopted, the competitiveness of the economy can be considered:

1) in the factor-based approach, understood as the ability of the economy to permanently increase productivity and improve the parameters of sustainable management, and to derive benefits from economic relations with foreign countries, consisting in the exchange of goods, services and inputs with the external environment; it is the **competitive ability of the economy**; the essence here is to look at competitiveness from the point of view of resources and skills available within the economy or sourced from abroad, which can be harnessed to improve the welfare of society; the competitive ability of the economy consists of two components: the real sphere (own resources, foreign resources, broadly defined infrastructure) and the institutional sphere (regulations, customs, system of values, etc.);
2) in the output-based approach, meaning the **competitive position**, which shows the development level of the economy and its sustainability, the country's share in the international division of labor, i.e., success in selling goods and services in international markets and in the exchange of inputs, taking into account the structure of turnover, prices, quality characteristics of goods, etc.; it is the result of the interaction between the state and the competitive behavior of companies operating in a country, i.e., business transactions and costs associated with these transactions.

In what aspects can the competitiveness of economies be analyzed? A synthesis of the various approaches described above makes it possible to systematize the list of the manifestations of competitiveness, which are sometimes considered to be its determinants:

- the ability to sell products and services on international markets (in short: ability to sell);
- the ability to make a country more attractive for foreign production factors (ability to attract);
- the ability to invent and innovate (ability to innovate);

- the ability to adjust to external and internal shocks (ability to adjust; resilience);
- the ability to form efficient institutions (ability to govern);
- the ability to increase income (ability to earn);
- the ability to increase environmental and social sustainability (ability to increase sustainability);
- the ability to build relationships and cooperate (ability to cooperate).

The importance of these factors is different for individual countries, and it largely depends on the level of economic development of the country concerned. Therefore, it seems reasonable to compare the international competitiveness of economies within a group of countries representing a similar level of development and being similar in terms of other characteristics (e.g., the openness of the economy, the structure of production, etc.).

1.3. Determinants of competitiveness

Competitiveness is closely related to the concept of competitive advantages, which, in the opinion of most researchers, are visible above all in the productivity of inputs. Competitive advantages can be viewed in static terms, and their occurrence then means that entities (e.g., economies) are characterized by higher (in absolute or relative terms) productivity of labor or capital. This approach corresponds with the findings of the classics, e.g., the Ricardian principle of comparative advantages. A competitive advantage may also result from having better, more efficient technology (Schumpeterian advantages). The dynamic understanding of competitive advantages is based on reference to changes in productivity over time, i.e., a relatively faster increase in the productivity of the production factors of a national economy compared to other economies, which consequently leads to an acceleration of socio-economic development [Porter, 1990, 2008; Misala, 2014]. The competitive advantages of nations are determined by four essential elements. They form a system known as the diamond of competitive advantage [Porter, 1990]. Gaining such advantage depends on the interaction of these four groups of factors represented graphically as apexes of this "diamond" [Porter, 1990, 2008]. These are:

- factor conditions (human resources, scientific base, technology, rate and efficiency of factor formation);
- demand conditions (the size and structure of demand stimulating innovation activities);
- related and supporting industries (fostering the exchange of ideas and innovation);
- firm strategy, structure, and competition.

As an extension of research on competitive advantages, the above list is complemented with government actions (policies) and the quality of governance that may strengthen (or weaken) the creation of these advantages [Dunning, 1992; Fainshmidt, Smith, Judge, 2016; Steinberg, Hennig, Oehmichen, Heigermoser, 2022]. Determining the competitive advantages of economies cannot be limited to internal factors only. The impact of internationalization on the formation of competitive advantages (creating advantages through foreign trade and inflow of foreign direct investments) is important [Markusen, Strand, 2009; Delgado et al., 2012]. Internationalization and the activities of multinational corporations play an important role in international trade and factor flows [Dunning, 1992; Delgado et al., 2012; Steinberg et al., 2022]. The inflow of foreign investments affects economic dynamics and growth, which is reflected in what is referred to as global investment attractiveness. It is the competitiveness of location relative to the costs of inputs, which determines the attractiveness of a country for foreign direct investments and affects the development of advantages in foreign trade.

According to most researchers, countries (as well as regions, industries or enterprises) can gain competitive advantages primarily by implementing innovations [cf., e.g., Porter, 1990, 2008; Dunning, 1992; Cantwell, 2006; Misala, 2014; Barrichello, Santos, Morano, 2020; Weresa, 2022]. These innovations can relate to the four abovementioned facets of Porter's "diamond" or to their mutual interactions. For this reason, competitiveness research must take into account innovation performance in relation to products and business processes, as well as business organization and institutions. Today, digital technologies play an important role, becoming key enabling technologies [Guellec, Paunov, 2018]. Digitalization stimulates the emergence of various types of innovations – technological, organizational, social; it changes the ways in which companies communicate with the market, facilitates cooperative networking between producers, suppliers, and users. Digital technologies foster the emergence of innovations that involve the opening of new markets or changing access to resources. Digital transformation may also mean the introduction of new business models. Numerous empirical analyses confirm the positive impact of digitalization on productivity [e.g., Cockburn, Henderson, Stern, 2018; Monaco, Bell, Nyamwena, 2019], although digital technologies can also have negative effects [Trittin-Ulbrich, Scherer, Munro, Whelan, 2021]. However, in view of their impact on productivity, they can be considered as one of the factors determining the competitiveness of economies.

1.4. The latest directions in competitiveness research

In what direction is the concept of competitiveness evolving in the face of the new challenges of the rapidly changing global economy? What aspects of competitiveness research are gaining in importance? The answer to these questions will be provided by an in-depth analysis of the latest literature published in 2020–2022, conducted in two steps. In the first step, bibliometric methods were used to assess the size of the world's scientific output in this field and to identify areas of greatest interest to researchers in the context of competitiveness. In the second step, an in-depth analysis of the latest scientific papers was carried out in terms of the main results and conclusions leading to the directions of further research.

1.4.1. Bibliometric analysis

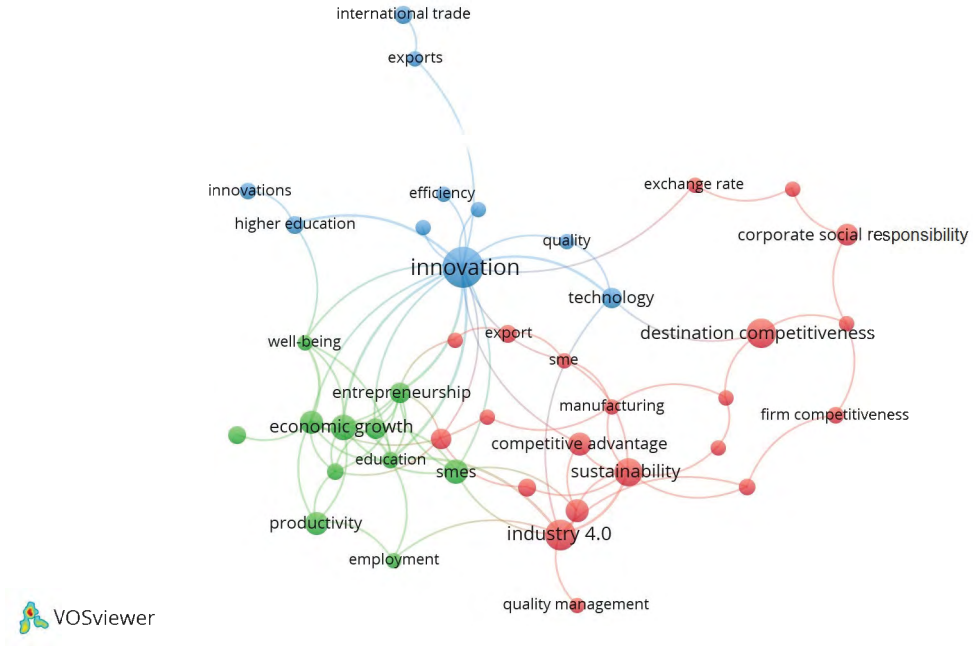
Bibliometric analysis includes techniques used for the quantitative analysis of scientific publications [Pritchard, 1969; Broadus, 1982; Pendlebury, 2010; Yalcin, Daim, 2021]. Its purpose is to identify trends in scientific analyses of the concept of competitiveness. The starting point is the selection of relevant scientific literature by keywords chosen on the basis of the literature review presented in the previous sub-chapter. The SCOPUS database of scientific publications was used, focusing on abstracts, titles and keywords of articles, conference papers, and reviews published in English. The SCOPUS database was searched on the basis of the following keywords: "competitiveness", "definition", "determinant", narrowing the results to disciplines such as economics and econometrics, business and management, social sciences, and interdisciplinary studies. The first round of searches yielded 2446 documents published between 1946 and 2022, with the number of publications increasing rapidly from the 1990s. Due to the planned timeframe of the study covering the period in which new conditions of economic activity and competitiveness appeared (due to COVID-19 pandemic), a sample of 522 publications was obtained after narrowing down the search to the years 2020–2022. Using this dataset, VOSviewer software was used to identify the research areas most frequently appearing in publications on the definition of competitiveness and its determinants. When examining the co-occurrence of research topics in the analyzed papers, those keywords that appear in the analyzed database of publications at least four times were taken into account, which allowed 53 recurring keywords to be selected. Grouping them according to the strength of the links between them, assuming that the group should contain at least ten keywords,

allows three main thematic areas to be indicated in which competitiveness and its determinants are examined. These are (Figure 1.1):

- **thematic area 1** (green in Figure 1.1), which focuses on traditional factors and dimensions of competitiveness such as productivity, economic growth, welfare;
- **thematic area 2** (blue), where researchers' interest focuses around innovation and technology, higher education and foreign trade;
- **thematic area 3** (red), where two strands prevail – Industry 4.0 and sustainability.

It can be concluded from the bibliometric analysis based on the co-occurrence of keywords in publications from the period 2020–2022 that the subject of competitiveness research conducted during the COVD-19 pandemic did not change substantially compared to the previous period. The three identified thematic areas had already appeared in the competitiveness literature before.

Figure 1.1. Main research areas in 2020–2022 relating to the concept of competitiveness, its definitions and determinants (keyword co-occurrence map)



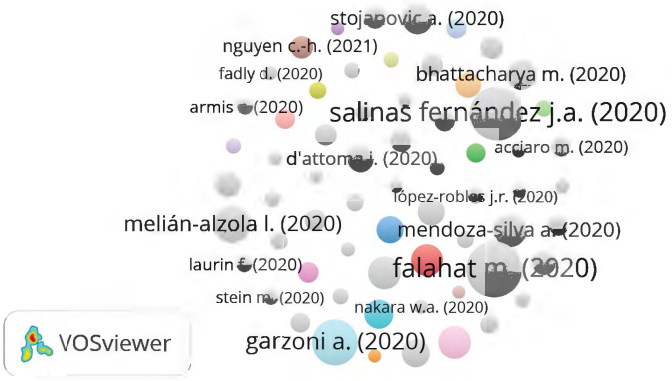
Source: compiled by author with the use of VOSviewer software.

What is interesting, however, are the linkages within the selected three groups. In the first thematic area, which encompasses traditional factors of competitiveness, the strength of co-occurrence is similar for all keywords. In the second group, innovation clearly dominates as a focal point of research. In the third group, two themes stand

out – sustainable competitiveness and digitalization. These are new dimensions of competitiveness [Kowalski, Weresa, 2019]. Therefore, it would be interesting to analyze the results of research in this thematic area in more depth in search for new approaches to the competitiveness of economies (more on this in the next sub-chapter).

The second element of bibliometric analysis, aimed at selecting publications for further in-depth analysis, involves identifying the papers that have the greatest impact on the development of competitiveness research. Citations were used as the basis for measuring impact, with ten as the minimum number of citations. This way, 64 documents (out of 522 papers) were selected from the sample. The results are shown in Figure 1.2.

Figure 1.2. Map of the most cited scientific papers published in 2020–2022 (by number of citations)*



* Minimum number of citations is 10.

Source: compiled by author with the use of VOSviewer software.

The use of bibliometric methods allows to show selected aspects and characterize the latest research on competitiveness. This picture was complemented by an analysis of the content of abstracts, which allowed key papers from the recent period to be selected. The selection was based on the following criteria:

1) falling within a thematic area that deals with new dimensions of competitiveness, i.e., Industry 4.0 and sustainable competitiveness;
2) macroeconomic level of analysis (competitiveness of economies);
3) impact on the development of research measured by citations (a minimum of one citation of paper).[1]

[1] A small number of citations was accepted due to the fact that only papers published in the years 2020–2022 are taken into account, so this is a relatively short period for the dissemination of research results, so one cannot expect high citations.

In the sample of publications from 2020–2022, there are 43 papers that meet these three criteria simultaneously. It turns out that as regards digital or sustainable competitiveness there are few papers dealing with competitiveness at the level of economies. Most of the studies concern selected sectors (e.g., manufacturing, automotive industry, tourism). The competitiveness of economies in the context of social or environmental sustainability is analyzed in 20 publications, digitalization and its role for competitiveness are the themes analyzed in 18 articles from a sample selected from the SCOPUS database, while these two aspects were discussed jointly in 5 publications. The main results of that research are described in the next sub-chapter.

1.4.2. Conclusions from the review of the latest research results

Both digitalization and sustainable competitiveness are relatively new areas of competitiveness research (Figure 1.1). A study by De La Vega Hernández and Barcellos de Paula [2021], based on bibliometrics and covering a wide range of publications from the period 1990–2020, found a steady increase in the convergence of the terms innovation and sustainable development. This led the authors to propose a new competitiveness strategy, which can be defined as the ability to innovate in a sustainable way. Timbalari [2021] proposed a slightly different view, considering both digitalization and sustainability as determinants of the competitiveness of economies. This conclusion is also based on an analysis of the competitiveness of European countries [Boikova, Zeverte-Rivza, Rivza, Rivza, 2021].

Cross-sectional studies of competitiveness factors conducted for 50 countries, for which the Global Competitiveness Index is calculated by the World Economic Forum, confirmed the positive impact of modern technologies on the competitive position. In addition, of the 12 pillars of competitiveness, the most important determinants of competitiveness are education, skills, public health, and market efficiency [Nogueira, Madaleno, 2021].

Klinger, Mateos-Garcia, and Stathoulopoulos [2021] use the example of deep learning analyses to show that digital technologies are general-purpose technologies and have a broad impact on competitiveness, as confirmed by the conclusions of earlier OECD studies [Planes-Satorra, Paunov, 2019]. A comparative analysis of the current state of digital competitiveness indicates that China has an advantage in this respect compared to Europe, and the key factors influencing the development of digitalization are global external conditions and national institutions [Zdražil, Kraftová, 2022].

Digitalization is part of the "smart economy". Research on EU countries in this respect has shown that smart economic development facilitates the improvement of the productivity of land, labor and capital, thus driving competitiveness. The

key determinants of competitiveness in this approach are legal environment, social responsibility, competence and knowledge building, and social security of employees [Bruneckiene, Rapsikevicius, Lukauskas, Zykiene, Jucevicius, 2021]. Similar analyses were carried out for Central and Eastern European countries [Dagiliene, Bruneckiene, Jucevičius, Lukauskas, 2020]. On their basis, two groups of factors influencing smart development were identified:

1) base factors, which include digitalization, the environment, social responsibility and welfare;
2) strengthening factors, such as learning ability, innovation, knowledge-based activities, agility.

This leads to two possible paths of competitiveness: a balanced one, using all factors proportionally, and the other focused on a few selected elements [Dagiliene et al., 2020].

Digital entrepreneurship is a strand of competitiveness research related to the subject of this monograph. Satalkina and Steiner [2020] developed indicators to measure this phenomenon, and they also found that the development level of digital entrepreneurship is determined to a large extent by the development model and conditions of the entire innovation system. As competitiveness is linked to the level of innovative capacity, digital entrepreneurship can be considered one of the pathways of this impact.

In the context of sustainable competitiveness and digitalization, the topic that appears in the latest literature on the subject is the circular economy (CE). Bressanelli, Adrodegari, Pigosso, and Parida [2022] describe the smart circular economy paradigm and propose that the potential of digital technologies should be leveraged to turn waste into a resource. On the basis of a broad literature review, De Angelis [2020], systematizes the concept of circular economy and makes an attempt to root this concept in management sciences, linking it with profitability and other aspects of competitiveness. He also points to future research directions on this issue and the need to develop case studies that could test the strength of the linkage between competitiveness and circular business models [De Angelis, 2020].

Sustainable competitiveness is the subject of many articles, most of which are empirical studies conducted for selected countries. Using a taxonomic measure of development, Cheba, Bąk, and Szopik-Depczyńska [2022] conducted analyses for European Union countries, focusing on mutual relationships and ways to measure the interdependence between competitive ability and competitive position in a sustainable dimension. The interdependence between the different elements of the holistic concept of sustainable competitiveness was confirmed.

Sustainable competitiveness is also considered in recent scientific literature in relation to energy supply, especially in the context of environmental sustainability.

According to Khan, Zakari, Dagar, and Singh [2022], energy transition that strikes a balance between affordability and access to energy, energy security, and environmental sustainability can a basis for prosperity and competitiveness. Research conducted by Bhattacharya, Inekwe, and Sadorsky [2020] in various regions of Australia shows that energy efficiency is a competitiveness factor of the economy, which is influenced, in addition to its initial level, by the structure of industry and fuel prices. The prerequisite for achieving an increase in energy efficiency are the restructuring of industry and changes in the fuel mix towards an increase in the use of renewable energy sources. The use of these sources is influenced not only by national factors, but also by global determinants of competitiveness. This is confirmed by studies on the sustainability of hydropower production in the EU, which are mostly affected by human capital, innovation ecosystem, market development, and sustainable international environment [Alsaleh, Abdul-Rahim, 2021].

In the latest research on competitiveness and its determinants, reference to the sharing economy also appears [Maalouf, Abi Aad, Masri, 2021]. A new approach to competitiveness that addresses this issue focuses on costs and the need to share different goods and the factors that influence this. Determinants refer to consumer preferences, especially in terms of environmental protection and social sustainability, with the issues of availability of substitutes and trust being also relevant [Maalouf et al., 2021]. The latter element – trust – indicates the growing role of relational competitiveness, which was discussed in earlier editions of this monograph [Kowalski, Weresa, 2021].

The above synthetic review of the latest scientific literature from 2020–2022 dealing with the two new dimensions of competitiveness, i.e., sustainable and digital competitiveness, points to several topics around which the most intense scientific discussion currently revolves in the literature. These are: smart economic development, digital entrepreneurship, sustainable innovation ability, the circular economy, sustainable competitiveness of the energy system, and the sharing economy. Empirical analyses of these issues, which have been performed so far, may form a basis for their conceptualization in the future.

1.5. Conclusions

Attempts to answer the question which determinants have the greatest impact on the competitiveness of countries have been undertaken for several decades. The conditions for economic activity and international cooperation are changing, competitiveness is also affected by external shocks (e.g., the global financial and economic crisis, the COVID-19 pandemic), a technological revolution is taking place,

new challenges are emerging (e.g., environmental degradation, climate change). In the light of these various changes, the question of the determinants of competitiveness remains important. To recapitulate on the analysis performed in this chapter, it should be noted that the competitiveness of the economy is the outcome of the activities of all individual players on the socio-economic and political scene, the result of the interactions between activities of the state and competitive behavior of companies operating in the market environment. In the latest scientific literature from the period 2020–2022, the dominant themes relating to the competitiveness of economies are sustainable business (in particular, issues of rational use of energy) as well as digitalization and smart economic development. There are also studies seeking to integrate these two strands (i.e., sustainable and digital competitiveness). Among the new factors of competitiveness, the growing importance of introducing innovations in a sustainable way or the benefits of the sharing economy are indicated.

This analysis has an exploratory character and does not exhaust all issues tackled in research on the competitiveness of economies. In summing up the research carried out in this chapter, its limitations must be kept in mind. First, only one database of scientific publications, i.e., SCOPUS, was selected as a source of data on the topic. It would be worth repeating the research by obtaining data from other databases (e.g., Web of Science) and comparing the results obtained. Second, the selection of publications whose review is provided in this chapter is to some extent the result of subjective decisions made by the author of this study, which may affect the results obtained, because due to the limited size of the chapter it was not possible to include in this analysis all publications selected from the database. Third, the analysis concerned only one level of competitiveness studies – the competitiveness of economies, and it would be worth conducting such research in a holistic way, combining the macro-, meso-, and microeconomic levels. An attempt to capture many phenomena that make up competitiveness in a systemic, holistic way seems to be an important and interesting direction for future competitiveness research.

Bibliography

Aiginger, K. (2006). Competitiveness: From a Dangerous Obsession to a Welfare Creating Ability with Positive Externalities. Special Issue on Competitiveness, *Journal of Industry, Competition and Trade*, 6(2), pp. 161–177.

Aiginger, K., Vogel, J. (2015). Competitiveness: From a Misleading Concept to a Strategy Supporting Beyond GDP Goals, *Competitiveness Review*, 25(5), pp. 497–523.

Alsaleh, M., Abdul-Rahim, A.S. (2021). Do Global Competitiveness Factors Effects the Industry Sustainability Practices? Evidence from European Hydropower Industry, *Journal of Cleaner Production*, 310. DOI: 10.1016/j.jclepro.2021.127492.

Barrichello, A., Santos, E.G. dos, Morano, R.S. (2020). Determinant and Priority Factors of Innovation for the Development of Nations, *Innovation and Management Review*, 17(3), pp. 307–320. DOI: 10.1108/INMR-04-2019-0040.

Bhattacharya, M., Inekwe, J.N., Sadorsky, P. (2020). Convergence of Energy Productivity in Australian States and Territories: Determinants and Forecasts, *Energy Economics*, 85. DOI: 10.1016/j.eneco.2019.104538.

Boikova, T., Zeverte-Rivza, S., Rivza, P., Rivza, B. (2020). The Determinants and Effects of Competitiveness: The Role of Digitalization in the European Economies, *Sustainability*, 13(21). DOI: 10.3390/su132111689.

Bressanelli, G., Adrodegari, F., Pigosso, D.C.A., Parida, V. (2022). Towards the Smart Circular Economy Paradigm: A Definition, Conceptualization, and Research Agenda, *Sustainability*, 14(9). DOI: 10.3390/su14094960.

Broadus, R.N. (1987). Toward a Definition of "Bibliometrics", *Scientometrics*, 12, pp. 373–379. DOI: 10.1007/BF02016680.

Bruneckiene, J., Rapsikevicius, J., Lukauskas, M., Zykiene I., Jucevicius, R. (2021). Smart Economic Development Patterns in Europe: Interaction with Competitiveness, *Competitiveness Review*, 33(2), pp. 302–331. DOI: 10.1108/CR-02-2021-0026.

Cantwell, J. (2006). Innovation and Competitiveness. In: *The Oxford Handbook of Innovation* (pp. 543–567), J. Fagerberg, D.C. Mowery (Eds.). Oxford: Oxford University Press. DOI: 10.1093/oxfordhb/9780199286805.003.0020.

Cheba, K., Bąk, I., Szopik-Depczyńska, K. (2020). Sustainable Competitiveness as a New Economic Category – Definition and Measurement Assessment, *Technological and Economic Development of Economy*, 26(6), pp. 1399–1421. DOI: 10.3846/tede.2020.13528.

Cockburn, I., Henderson, R., Stern, S. (2018). The Impact of Artificial Intelligence on Innovation, *NBER Working Papers*, 24449. DOI: 10.3386/w24449.

Dagiliene, L., Bruneckiene, J., Jucevičius, R., Lukauskas, M. (2020). Exploring Smart Economic Development and Competitiveness in Central and Eastern European Countries, *Competitiveness Review*, 30(5), pp. 485–505. DOI: 10.1108/CR-04-2019-0041.

De Angelis, R. (2020). Circular Economy: Laying the Foundations for Conceptual and Theoretical Development in Management Studies, *Management Decision*, 59(6), pp. 1209–1227. DOI: 10.1108/md-05-2019-0587.

De La Vega Hernández, I.M., Barcellos de Paula, L. (2021). Scientific Mapping on the Convergence of Innovation and Sustainability (Innovability): 1990–2018, *Kybernetes*, 50(10), pp. 2917–2942. DOI: 10.1108/K-05-2020-0328.

Delgado, M., Ketels, Ch., Porter, M.E., Stern, S. (2012). The Determinants of National Competitiveness, *NBER Working Papers*, 18249. DOI: 10.3386/w18249.

Dunning, J.H. (1992). The Competitive Advantage of Countries and the Activities of Transnational Corporations, *Transnational Corporations*, 2, pp. 135–168.

Fainshmidt, S., Smith, A., Judge, W.Q. (2016). National Competitiveness and Porter's Diamond Model: The Role of MNE Penetration and Governance Quality, *Global Strategy Journal*, 6(2), pp. 81–104.

Guellec, D., Paunov, C. (2018). Innovation Policy in the Digital Age, *OECD Science, Technology and Innovation Policy Papers*, 59. DOI: 10.1787/eadd1094-en.

Hausner, J. (Ed.) (2013). *Konkurencyjna Polska. Jak awansować w światowej lidze gospodarczej?*. Kraków: Fundacja Gospodarki i Administracji Publicznej.

Khan, I., Zakari, A., Dagar, V., Singh, S. (2022). World Energy Trilemma and Transformative Energy Developments as Determinants of Economic Growth Amid Environmental Sustainability, *Energy Economics*, 108. DOI: 10.1016/j.eneco.2022.105884.

Kirjavainen, J., Saukkonen, N. (2020). Sustainable Competitiveness at the National, Regional, and Firm Levels. In: *Responsible Consumption and Production. Encyclopedia of the UN Sustainable Development Goals* (pp. 740–751), W.L. Filho, A.M. Azul, L. Brandli, P.G. Özuyar, T. Wall (Eds.). Cham: Springer. DOI: 10.1007/978-3-319-95726-5_4.

Klinger, J., Mateos-Garcia, J., Stathoulopoulos, K. (2021). Deep Learning, Deep Change? Mapping the Evolution and Geography of a General Purpose Technology, *Scientometrics*, 126(7), pp. 5589–5621.

Kowalski, A.M. (2022). Resilience and Vulnerability to Economic Crisis: Implications for Competitiveness. In: *Poland: Competitiveness Report 2022. Towards a Sustainable Economy in a Pandemic Era* (pp. 25–40), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Kowalski, A.M., Weresa, M.A. (2019). The Concept and Dimensions of International Competitiveness – Selected Theoretical Aspects. In: *Poland: Competitiveness Report 2019. International Competitiveness in the Context of Development of Industry 4.0* (pp. 13–26), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Kowalski, A.M., Weresa, M.A. (2021). International Competitiveness and Cooperation in Times of Economic Crises – Theoretical Aspects. In: *Poland: Competitiveness Report 2021. Bilateral Economic Cooperation and Competitive Advantages* (pp. 13–26), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Maalouf, J.T., Abi Aad, A., El Masri, K. (2021). Competitiveness of Sharing Economy Companies in Emerging Markets, *Competitiveness Review*, 31(2), pp. 297–309. DOI: 10.1108/CR-05-2019-0058.

Markusen, J.R., Strand, B. (2009). Adapting the Knowledge-Capital Model of the Multinational Enterprise to Trade and Investment in Business Services, *The World Economy*, 32(1), pp. 6–29.

Misala, J. (2014). Theoretical Grounds of the Development of Long-Term Competitive Advantages in International Trade. In: *Innovation, Human Capital and Trade Competitiveness. How Are They Connected and Why Do They Matter?* (pp. 3–51), M.A. Weresa (Ed.). Cham: Springer.

Monaco, L., Bell, J., Nyamwena, J. (2019). Understanding Technological Competitiveness and Supply Chain Deepening in Plastic Auto Components in Thailand: Possible Lessons for South Africa, *CCRED Working Paper*, 1. DOI: 10.2139/ssrn.3384027.

Nogueira, M.C., Madaleno, M. (2021). New Evidence of Competitiveness Based on the Global Competitiveness Index, *Economics Bulletin*, 41(2), pp. 788–797.

Pedersen, O.K. (2010). Institutional Competitiveness: How Nations Came to Compete. In: *The Oxford Handbook of Comparative Institutional Analysis* (pp. 625–658), G. Morgan, J.L. Campbell, C. Crouch, O.K. Pedersen, R. Whitley (Eds.). Oxford: Oxford University Press.

Pendelbury, D.A. (2010). *White Paper. Using Bibliometrics in Evaluating Research*. Philadelphia: Thomson Reuters.

Planes-Satorra, S., Paunov, C. (2019). The Digital Innovation Policy Landscape in 2019, *OECD Science and Innovation Policy Papers*, 71. DOI: 10.1787/6171f649-en.

Porter, M.E. (1990). *The Competitive Advantage of Nations*. New York: Free Press.

Porter, M.E. (2008). *On Competition.* Cambridge: Harvard Business School Publishing.

Prasetyo, P.E., Setyadharma, A., Kistanti, N.R. (2021). Integration and Collaboration of Determinants of Entrepreneurial Competitiveness, *Uncertain Supply Chain Management*, 9(3), pp. 585–594.

Pritchard, A. (1969). Statistical Bibliography or Bibliometrics, *Journal of Documentation*, 25, pp. 348–349.

Satalkina, L., Steiner, G. (2020). Digital Entrepreneurship: A Theory-Based Systematization of Core Performance Indicators, *Sustainability*, 12(10), 4018. DOI: 10.3390/SU12104018.

Steinberg, P.J., Hennig, J.C., Oehmichen, J., Heigermoser, J. (2022). How the Country Context Shapes Firms' Competitive Repertoire Complexity, *Global Strategy Journal*, pp. 1–29. DOI: 10.1002/gsj.1458.

Timbalari, C. (2021). The Determinants of International Competitiveness, *Studies in Business and Economics*, 16(3), pp. 247–265. DOI: 10.2478/sbe-2021–0058.

Trittin-Ulbrich, H., Scherer, A.G., Munro, I., Whelan, G. (2021). Exploring the Dark and Unexpected Sides of Digitalization: Toward a Critical Agenda, *Organization*, 28(1), pp. 8–25. DOI: 10.1177/1350508420968184.

Weresa, M.A. (2022). The Concept of Sustainable Competitiveness: Literature Review and Directions of Further Research. In: *Poland: Competitiveness Report 2022. Towards a Sustainable Economy in a Pandemic Era* (pp. 13–24), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Yalcin, H., Daim, T. (2021). A Scientometric Review of Technology Capability Research, *Journal of Engineering and Technology Management*, 62. DOI: 10.1016/j.jengtecman.2021.101658.

Zdražil, P., Kraftová, I. (2022). The Determinants of Competitive Advantage for Europe's Regions: Digital Economy at the Start of the Fourth Industrial Revolution, *Ekonomicky Casopis*, 70(5), pp. 450–471.

Chapter 2

Entrepreneurship as the Factor of Competitiveness, and the Role of Start-Ups

Arkadiusz Michał Kowalski

2.1. Introduction

Entrepreneurship, like competitiveness, is a multidimensional phenomenon of great importance for the economy and society. The aim of this chapter is to demonstrate the concept of entrepreneurship, its theoretical origins and implications for competitiveness, with special focus on the role of new business formation and start-ups. The chapter starts with presentation of the most important economic theories that provide the conceptual frameworks for the concept of entrepreneurship. Based on different approaches to entrepreneurship, varieties of definitions of this term are provided. Particular focus is put on start-ups, which can be seen both as a distinct form of entrepreneurship and as a distinct mechanism for developing innovations. Based on the observations of the Silicon Valley model of entrepreneurship, the role of clusters in entrepreneurship and new business formation is explored.

2.2. Theoretical sources for the concept of entrepreneurship

The origins of the concept of entrepreneurship may be found in classical economics, when Mill [1848] perceived entrepreneur as someone who takes risks and employs his skills and labor to manage a business, receiving profit as renumeration. Another economist, Say [1836], emphasized the significance of knowledge in entrepreneurship, which is the practical application of knowledge that results in wealth creation. As such, his ideas are close to the understanding of innovation process, and he underlined the role of experimentation, which is not always compensated by profits and therefore involves risk. Additionally, Say emphasized the entrepreneur's functions of coordination, organization, and supervision.

The role of entrepreneur is highlighted by the Austrian school of economics. Von Hayek [1937] argued that entrepreneurs are crucial in setting prices for goods and because of that they incentivize trade. Thus, entrepreneurs contribute to achieving market equilibrium through ongoing efforts to determine the correct prices for goods. This is in opposition to neoclassical economics, which assumes that entrepreneurs must operate within given price and output data [Kirzner, 2000]. According to von Mises [1996], entrepreneurs:

- make profit by exploiting differences in prices,
- capitalize on existing opportunities,
- encourage market activity and output.

A significant contribution to the concept of entrepreneurship was provided by Joseph Schumpeter, who combined this concept with innovation by defining an entrepreneur as an innovator, who creates novel combinations to initiate the process of economic development through the launch of new goods or markets, and the creation of a new industrial organization. Entrepreneurs work within the system to bring about desired changes in the economic routine. Their main economic function is to revolutionize production through innovation in the process of creative destruction. The concept of creative destruction can be examined at three levels: microeconomic, mesoeconomic, and macroeconomic [Zorska, 2011, p. 21].

The process of creative destruction, according to Schumpeter's theory, underpins all economic change and progress. Microeconomic innovation, or innovation at the level of a single company, is the catalyst that kickstarts this process by abandoning outdated production methods, disposing of them, and implementing new solutions that boost production, sales, and profits. This encourages other entrepreneurs to make similar adjustments, resulting in a wide range of structural changes in industry, i.e., at the mesoeconomic level. Today, mesoeconomic creative destruction is discussed in a broader context, and it may include elements such as industrial structures, traditional business regulations, traditional competitive strategies, and standard technological assumptions and concepts of scientific and technological progress [Domański, 2010, p. 38].

At the macroeconomic level, implemented innovations and structural reforms promote economic development and increased competitiveness. However, in the subsequent era of creative destruction, competition among enterprises, as well as insufficient demand, result in lower earnings and the clearing of the market of unprofitable businesses. As a result, the economic crisis is characterized by increased competition among entrepreneurs, prompting businesses to innovate in order to maintain a competitive advantage [Filippetti, Archibugi, 2011]. Following that, there is industrial consolidation and concentration, as well as the formation of various types of

cooperative partnerships. The introduction of new technologies and industrial clusters formed by entrepreneurs frequently triggered by structural issues in traditional areas of the economy. According to Mokyr [1997], a true industrial revolution includes not only technological advances but also those that have an impact at the level of industrial organization. Furthermore, when there is a crisis, new specialization patterns emerge, such as the emergence of new sectors and technological solutions, which is critical for economic recovery. Schumpeter's creative destruction is centered on the fundamental subject of entrepreneurship, where human ingenuity is viewed as the most important tool in combating crisis situations [Jackson, 2020]. Entrepreneurship, particularly in areas relating to new technologies associated with industrial production, service delivery networks, and education, must take a new turn, which may skew people's perceptions of the new normal, which is typically associated with the vagaries of emerging technologies [Jackson, 2021].

2.3. Defining entrepreneurship

Entrepreneurship, like competitiveness, is a multidimensional phenomenon and it lacks a single, universally accepted definition. Conceptualizations of entrepreneurship, for example, as a characteristic, behavior, activity and social role, attracted the attention of many academic disciplines, including economics, sociology, history, and psychology, due to its complex nature and, at the same time, importance for economic and societal progress. Researchers approach the topic of entrepreneurship using a variety of perspectives, theories, and methodologies. According to Venkataraman [1997], entrepreneurship research tries to figure out how opportunities to create future goods and services are discovered, created, and exploited, by whom, and what the results are.

Entrepreneurship is a complex phenomenon that involves a wide range of activities, which is one of the reasons why there are different definitions and concepts of entrepreneur and entrepreneurship. One of the most important approaches is defining entrepreneurship as:

- **new business formation**, which is a simple definition that reduces the essence of entrepreneurship to establishing [e.g., Gartner, 1989; Lumpkin, Dess, 1996] or owning a business [Blanchflower, Oswald, 1998]; from that point of view, all proprietors of independent businesses, including self-employed persons, are entrepreneurs; the market entry approach to understanding entrepreneurship is reflected in the international comparative studies on entrepreneurship, for example the Global Entrepreneurship Monitor, which defines entrepreneurship as "any attempt at

new business or new venture creation, such as self-employment, a new business organization, or the expansion of an existing business, by an individual, a team of individuals, or an established business" [GEM, 2022];

- **opportunity identification and exploitation**, which is a process that requires effort, commitment of scarce resources, and entrepreneurial judgement. Some economists focus more on discovery of entrepreneurial opportunities [Kirzner, 1973], whereas according to the Schumpeterian approach opportunities are created; the majority of economists acknowledge that opportunity must be recognized and taken advantage of in order to be realized, but they also admit that doing so needs creativity and sound judgment; entrepreneurial opportunities may be understood as those situations in which new goods, services, raw materials, and organizing methods can be introduced and sold at greater than their cost of production [Shane, Venkataraman, 2000, p. 220]; this approach leads to the definition of entrepreneurship as "the pursuit of opportunities without regard to resources currently controlled" [Stevenson, Gumpert, 1985];
- **innovation activity**, which founds its origin in Schumpeterian perception of entrepreneurship as synonymous with innovation; although many economists agree that entrepreneurship and innovation are strongly related, most of them state that equating innovation with entrepreneurship seems to be too narrow an approach and that entrepreneurs can be innovative or not; for example, Baumol, Schilling, and Wolff [2009] introduced the distinction between innovative and imitative entrepreneurship, claiming that only innovative entrepreneurs contribute to productivity growth; many academics, when discussing creative entrepreneurship, directly refer to Schumpeter's original theory, calling innovative businesses as "Schumpeterian firms" and the entrepreneurial activity that deals with innovation as "Schumpeterian entrepreneurship" [e.g., Block, Fisch, Praag, 2017; Szerb, Lafuente, Horváth, Páger, 2018];
- **judgement-making**, which highlights the role of making judgement in entrepreneurship [Casson, 2010]; such judgement, which is based on an original combination of many items of information, might be made regarding business partners, consumer preferences, demand, or prices [Casson, 2003]; an effective entrepreneur is a person who has the right information and is capable of making good decisions in uncertain situations; this approach leads to the definition of an entrepreneur as "someone who specializes in taking responsibility for and making judgmental decisions that affect the location, form, and the use of goods, resources or institutions" [Hébert, Link, 1989, p. 47];
- **leadership**, which perceives entrepreneurs as leaders, who inspire and motivate followers to achieve organizational goals, motivate employees [Alfaiza, Abed,

Sultan, Riyadh, 2021], enhance innovative behavior [Wang, Ren, Chadee, Liu, Cai, 2021] because of their ability to shape better work environment [Lee et al., 2020; Islam, Zahra, Rehman, Jamil, 2022].

2.4. The role of start-ups

As is the case with the concepts of competitiveness and entrepreneurship, start-ups lack a single, universally accepted definition. The term has become popular in recent years across the academic literature, policy papers, and the media, but it is still vague [Cockayne, 2019]. There is a lack of systematic understanding of the various approaches and criteria used to categorize innovative start-ups, as well as how these relate to the peculiarities of these businesses. Audretsch, Colombelli, Grilli, Minola, and Rasmussen [2020] highlight the dual nature of start-ups, which can be seen both as a distinct form of entrepreneurship and as a distinct mechanism for developing innovations.

According to Blank and Dorf [2014, p. 56], a startup is a group of people looking for a repeatable and scalable business model, working under conditions of extreme uncertainty. There are four elements that need to be explained for full understanding of this definition [de Oliveira, Zotes, 2018]:

1) **business models**, referring to the strategies used by start-ups to create value for their clients and transform that value into revenue for the firm;
2) **replicable**, understood as the ability of products that do not have an inventory limit to be continuously available to customers, and to require little customization or adaptation;
3) **scalable**, referring to the ability to expand to a large scale, given a large number of customers, and grow so that operating costs increase much more slowly than revenue;
4) **conditions of extreme uncertainty**, which are related to the fact that, despite market research, financial viability, and operational viability associated with the formation of a start-up, they do not assume certainty regarding the project's success and consumer acceptance.

Start-ups usually operate in a highly competitive and difficult environment, with start-up failure rate around 90%, in which to achieve success startups have to grow faster than the competition [Erdogan, Koohborfardhaghighi, 2019]. To overcome high mortality rates, start-ups must look for highly profitable niches to innovate without the need for large investments, introducing differentiated products and services with the aim of fostering customer loyalty [Moroni, Arruda, Araujo, 2015]. Pugliese,

Bortoluzzi, and Balzano [2022] investigated the following factors driving the growth of start-up firms:

1) **individual and team-related drivers**, which include variables referring to the personal aspirations, attitudes, skills, and experience of the founding entrepreneur;
2) **marketing- and strategy-related drivers**, which include drivers associated with firm decisions with strategic relevance, such as differentiation, low-cost strategies or diversification strategies, and marketing-related drivers, such as marketing planning and intensity;
3) **context-related drivers**, which are related to the role of institutional factors, e.g., culture, norms, infrastructure, and other supportive or hindering factors characterizing the start-up's surrounding environment, such as the innovation ecosystem, public policies, and industrial clusters;
4) **industry- and market-related drivers**, which include drivers connected with the effects of the market dynamics and industry structure, such as market attractiveness, industry complexity, competition intensity, and industry growth rate;
5) **firm-level resources and capabilities**, which include specific resources and abilities that new businesses have or can access, which determine their growth processes, such as technological and financial resources or networking capabilities;
6) **past performance**, which refers to pre-existing dynamics (e.g., growth path, profitability and success) that are thought to open up opportunities for the company's future expansion.

Start-ups can be supported by accelerators and incubators, which lower the risk of failure [Gazel, Schwienbacher, 2021]. Additionally, compared to start-ups that are not placed in an acceleration environment, business accelerators help start-ups develop their dynamic capabilities, giving them a competitive advantage and superior performance in the market [García-Ochoa, De Pablos-Heredero, Jimenez, 2022]. Start-ups must create something new or improve an existing product or service, seeking to solve a real problem in the market [Silva Júnior, Siluk, Neuenfeldt Júnior, Rosa, Michelin, 2022]. According to Abadia [2021], the successes of start-ups depend on factors related to disruptive innovation, leadership, and location within specialized clusters.

2.5. Entrepreneurship and new business formation in clusters

An important contribution to the development of the concept of entrepreneurship and start-ups is provided by the observations of the Silicon Valley, a cluster of utmost importance for the development and dissemination of the start-up creation model

replicated all over the world [Cockayne, 2019; de Oliveira, Zotes, 2018; Weiss, 2014]. It is occasionally referred to as the "Silicon Valley model of entrepreneurship", which, according to Audretsch [2019], is focused on high-technology companies which are founded on the assumption that potential innovation will be more radical than incremental. Research and development or, more generally, ideas developed in the organizational context of an established company or organization, such as a university, provide opportunities to launch a new business. A thriving environment or ecosystem for start-ups is driven by an abundance of fresh ideas. However, only a small portion of entrepreneurial ventures succeed by bringing new ideas to life and producing rapid growth rates, while the majority stagnate and eventually fail.

According to Bryzek [2005], thousands of start-up companies that were created in Silicon Valley are responsible for economic and technological changes in the world. Disruptive technologies have had a significant impact, underpinning not only a shift in consumer behavior but also a new learning curve that has resulted in a significant cost reduction. The research results published by Fuerlinger and Garzik [2022] confirm that Silicon Valley is important in the development of cutting-edge technologies and in establishing new global trends. For the time being, the region continues to dominate the global start-up and innovation scene.

In analyzing the role of clusters in local entrepreneurship, it is necessary to distinguish between the cluster and a category related to it, but not identical – the cluster initiative [Kowalski, 2020]. The classical definition states that clusters are "geographic concentrations of interconnected companies, suppliers, service providers, firms in related industries, and associated institutions (e.g., universities, standards agencies, and trade associations) in particular fields that compete but also cooperate" [Porter, 1998, p. 197]. Based on this definition, the basic characteristics of clusters can be distinguished [Kowalski, Marcinkowski, 2014]:

- geographic and industry concentration (specialization);
- relations of cooperation and competition (coopetition) between cluster participants.

Cluster initiatives, on the other hand, are organized activities aimed at intensifying the growth and competitiveness of clusters in a region, involving cluster companies, government and/or the research community [Sölvell, Lindqvist, Ketels, 2003, p. 9]. Thus, they are an institutionalized form of cooperation among a group of entities that undertake a specific project or other formalized activity, such as applying for public funds. The activities of a cluster initiative, which include representing its members and managing internal and external relations, are carried out by a legal entity called a cluster organization, which is involved in cluster management, including the development of rules for participation and access to common infrastructure or activities. The establishment of a cluster organization is therefore in itself an entrepreneurial

act of a group of cooperating regional entities. In practice, the function of a cluster organization is most often performed by associations, foundations, limited liability companies, research and development units, universities, chambers of commerce or science and technology parks.

The activities of a cluster organization may be treated as entrepreneurial activities, as it provides various services to the entities in the cluster, such as information exchange, training and consulting, joint promotion, sharing of common infrastructure, technology transfer, market analysis, etc. Cluster initiatives and organizations are coordinated by a cluster facilitator, who is usually an individual involved at the stage of establishing a cluster initiative, having a vision of cooperation and promoting it among potential members of the initiative being set up [Weresa, Kowalski, Sieńko-Kułakowska, 2017]. While appreciating the importance of cluster initiatives and organizations in stimulating local entrepreneurship, it should be emphasized that they are not the same as clusters, which are viable regional economic structures. According to Porter [1998], clusters influence competitiveness in three broad ways:

1) by increasing the productivity of companies based in the area;
2) by driving the direction and pace of innovation;
3) by stimulating the formation of new businesses within the cluster.

As demonstrated above, encouraging new business formation is one of the most important contributions of such clusters to competitiveness. This is proved by many empirical studies. For example, Barrios, Hochberg, Macciocchi [2021], using novel data on new business registrations, document that the number and quality of new business formation is clustered more in certain areas than could be expected merely by chance. Porter [1998] argues that it is not surprising that many new businesses establish themselves within an existing cluster as opposed to in remote areas. For a number of reasons, clusters aid in the development of new businesses. People who are part of a cluster are better able to identify market gaps in goods or services which their own businesses can fill. In addition, entry barriers are lower. Within a cluster, extensive market, technical, and competitive information builds up, and members have priority access to it. The cluster location frequently has the necessary resources, including staff, inputs, and skills, all ready to be incorporated into a new business. Investments made by businesses in testing laboratories, quality centers, infrastructure, and training programs result in increased productivity. Due to their familiarity with the cluster, local financial institutions and investors are more willing to extend better credit terms to the cluster companies. Additionally, the cluster frequently offers a sizable local market, and an entrepreneur may profit from existing linkages. All of these elements lower the perceived risks of entry or even exit in case when a business is unsuccessful.

2.6. Conclusions

An examination at any economic level, either focused on a company or the economy at large, leads to the conclusion that there is a strong relationship between entrepreneurship and competitiveness. However, a more thorough investigation of this relationship reveals that there is a variety of aspects and factors influencing this complex relationship. Both competitiveness and entrepreneurship are multidimensional phenomena with different definitions, methodologies, and conceptualizations. Entrepreneurship itself may be regarded in different ways, e.g., as new business formation, opportunity identification and exploitation, innovation activity, judgement-making, or leadership.

A particularly complex relationship can be observed between competitiveness and start-ups, which usually operate in a highly competitive and difficult environment, ridden, among other things, with a high failure rate. Thus, it is important to identify main groups of critical factors, which help to overcome high mortality rates and drive the growth of start-up firms, such as individual and team-related characteristics, marketing and strategy, institutional factors, market dynamics and industry structure, firm-level resources and capabilities, as well as past performance.

Insights for the concepts of entrepreneurship and start-ups are provided by the experience of the Silicon Valley, a critical cluster for the creation and spread of the start-up model that has been duplicated all over the globe. It is also referred to as the "Silicon Valley model of entrepreneurship", which is centered on high-tech companies that develop radical innovation leading to economic and technological changes and new global trends in the world economy. This observation provides the rationale to highlight new business formation as one of the key contributions of clusters to competitiveness.

Bibliography

Abadía, A. (2021). Study on Leadership and Innovation: Clues for Success in Technology-Related Startups, *Cuadernos de Gestión*, 21(2), pp. 109–118. DOI: 10.5295/cdg.191140aa.

Alfaiza, S.A., Abed, A.Y., Sultan, A.A., Riyadh, H.A. (2021). Moderating Role of Leadership Between Mass Collaboration and Quality of Knowledge: A Case of Iraq's Pharmaceutical Sector, *International Journal of Organizational Analysis*, 31(4), pp. 988–1000. DOI: 10.1108/IJOA-08-2021-2891.

Audretsch, D. (2019). Have We Oversold the Silicon Valley Model of Entrepreneurship?, *Small Business Economics*, 56(4). DOI: 10.1007/s11187-019-00272-4.

Audretsch, D., Colombelli, A., Grilli, L., Minola, T., Rasmussen, E. (2020). Innovative Start-Ups and Policy Initiatives, *Research Policy*, 49(10). DOI: 10.1016/j.respol.2020.104027.

Barrios, J.M., Hochberg, Y., Macciocchi, D. (2021). Rugged Entrepreneurs: The Geographic and Cultural Contours of New Business Formation, *NBER Working Papers*, 28606. DOI: 10.3386/w28606.

Baumol, W.J., Schilling, M.A., Wolff, E.N. (2009). The Superstar Inventors and Entrepreneurs: How Were They Educated?, *Journal of Economics and Management Strategy*, 18(3), pp. 711–728. DOI: 10.1111/j.1530-9134.2009.00227.x.

Blanchflower, D.G., Oswald, A.J. (1998). What Makes an Entrepreneur?, *Journal of Labor Economics*, 16(1), pp. 26–60. DOI: 10.1086/209881.

Block, J.H., Fisch, C.O., Praag, M. van (2017). The Schumpeterian Entrepreneur: A Review of the Empirical Evidence on the Antecedents, Behaviour and Consequences of Innovative Entrepreneurship, *Industry and Innovation*, 24(1), pp. 61–95. DOI: 10.1080/13662716.2016.1216397.

Bryzek, J. (2005). MEMS Startup: Disruptive Technology and Business Do's and Don'ts, *Biomedical Applications of Micro and Nanoengineering*, 5651, pp. 1–12.

Casson, M. (2003). *The Entrepreneur: An Economic Theory*, 2nd ed. Cheltenham: Edward Elgar. DOI: 10.4337/9781843765639.

Casson, M. (2010). *Entrepreneurship: Theory, Networks, History*. Cheltenham: Edward Elgar.

Cockayne, D. (2019). What Is a Startup Firm? A Methodological and Epistemological Investigation into Research Objects in Economic Geography, *Geoforum*, 107, pp. 77–87. DOI: 10.1016/j.geoforum.2019.10.009.

Domański, R. (2010). Mechanizm ewolucji przestrzennego zagospodarowania. In: *Przekształcenia struktur regionalnych. Aspekty społeczne, ekonomiczne i przyrodnicze* (pp. 35–46), S. Ciok, P. Migoń (Eds.). Wrocław: Instytut Geografii i Rozwoju Regionalnego Uniwersytetu Wrocławskiego.

Dorf, B., Blank, S. (2018). *Startup: Manual do Empreendedor: O Guia Passo a Passo para Construir uma Grande Empresa*. Rio de Janeiro: Alta Books Editora.

Erdogan, E., Koohborfardhaghighi, S. (2019). Delivering a Systematic Framework for the Selection and Evaluation of Startups. In: *Economics of Grids, Clouds, Systems, and Services* (pp. 151–159), C. Pham, J. Altmann, J.A. Bañares (Eds.). Cham: Springer Verlag. DOI: 10.1007/978-3-030-13342-9_13.

Filippetti, A., Archibugi, D. (2011). Innovation in Times of Crisis: National Systems of Innovation, Structure, and Demand, *Research Policy*, 40(2), pp. 179–192.

Fuerlinger, G., Garzik, L. (2022). Silicon Valley Innovation System. In: *Successful Innovation Systems* (pp. 225–247), L. Garzik (Ed.). Cham: Springer.

García-Ochoa, C.P., De Pablos-Heredero, C., Jimenez, F.J.B. (2022). The Role of Business Accelerators in Generating Dynamic Capabilities Within Startups, *International Journal of Entrepreneurship and Innovation Management*, 26(1–2), pp. 25–42. DOI: 10.1504/IJEIM.2022.120879.

Gartner, W.B. (1989). "Who Is an Entrepreneur?" Is the Wrong Question, *Entrepreneurship Theory and Practice*, 13(4), pp. 47–68. DOI: 10.1177/104225878901300406.

Gazel, M., Schwienbacher, A. (2021). Entrepreneurial Fintech Clusters, *Small Business Economics*, 57(2), pp. 883–903. DOI: 10.1007/s11187-020-00331–1.

GEM (2022). *How GEM Defines Entrepreneurship*, http://gem-consortium.ns-client.xyz/wiki/1149 (accessed: 10.11.2022).

Hayek, F.A. von (1937). Economics and Knowledge, *Economica*, 4(13), pp. 33–54. DOI: 10.2307/2548786.

Hébert, R.F., Link, A.N. (1989). In Search of the Meaning of Entrepreneurship, *Small Business Economics*, 1(1), pp. 39–49, http://www.jstor.org/stable/40228492 (accessed: 10.11.2022).

Islam, T., Zahra, I., Rehman, S.U., Jamil, S. (2022). How Knowledge Sharing Encourages Innovative Work Behavior Through Occupational Self-Efficacy? The Moderating Role of Entrepreneurial Leadership, *Global Knowledge, Memory and Communication*, 17. DOI: 10.1108/GKMC-02-2022–0041.

Jackson, E.A. (2020). Economics of Technology Innovation for Sustainable Growth – Reference to Sub-Saharan Africa (SSA) Region. In: *Industry, Innovation and Infrastructure. Encyclopedia of the UN Sustainable Development Goals* (pp. 1–12), W. Leal Filho, A. Azul, L. Brandli, A.L. Salvia, T. Wall (Eds.). Cham: Springer. DOI: 10.1007/978–3–319–71059-4_128–1.

Jackson, E.A. (2021). Creative Destruction Theory Space as the Ultimate End for Post-COVID-19 Recovery in Sub-Saharan Africa, *Economic Insights – Trends and Challenges*, 2, pp. 9–17.

Kirzner, I.M. (1973). *Competition and Entrepreneurship*. Chicago: University of Chicago Press.

Kirzner, I.M. (2000). *The Driving Force of the Market. Essays in Austrian Economics*. London: Routledge.

Kowalski, A.M. (2020). Towards an Asian Model of Clusters and Cluster Policy: The Super Cluster Strategy, *Journal of Competitiveness*, 12(4), pp. 74–90. DOI: 10.7441/joc.2020.04.05.

Kowalski, A.M., Marcinkowski, A. (2014). Clusters Versus Cluster Initiatives, with Focus on the ICT Sector in Poland, *European Planning Studies*, 22(1), pp. 20–45. DOI: 10.1080/09654313.2012.731040.

Lee, A., Legood, A., Hughes, D., Tian, A.W., Newman, A., Knight, C. (2020). Leadership, Creativity and Innovation: A Meta-Analytic Review, *European Journal of Work and Organizational Psychology*, 29(1), pp. 1–35.

Lumpkin, G.T., Dess, G.G. (1996). Clarifying the Entrepreneurial Orientation Construct and Linking It to Performance, *The Academy of Management Review*, 21(1), pp. 135–172. DOI: 10.2307/258632.

Mill, J.S. (1848). *Principles of Political Economy with some of their Applications to Social Philosophy*. London: John W. Parker.

Mises, L. von (1949). *Human Action: A Treatise on Economics*. New Haven: Yale University Press.

Mokyr, J. (1997). Are We Living in the Middle of an Industrial Revolution?, *Economic Review*, 82(2), pp. 31–43.

Moroni, I., Arruda, A., Araujo, K. (2015). The Design and Technological Innovation: How to Understand the Growth of Startups Companies in Competitive Business Environment, *Procedia Manufacturing*, 3, pp. 2199–2204. DOI: 10.1016/j.promfg.2015.07.361.

Oliveira, F.B. de, Zotes, L.P. (2018). Valuation Methodologies for Business Startups: A Bibliographical Study and Survey, *Brazilian Journal of Operations and Production Management*, 15(1), pp. 96–111.

Porter, M.E. (1998). Clusters and the New Economics of Competition, *Harvard Business Review*, 76(6), pp. 77–90.

Pugliese, R., Bortoluzzi, G., Balzano, M. (2022). What Drives the Growth of Start-Up Firms? A Tool for Mapping the State-of-the-Art of the Empirical Literature, *European Journal of Innovation Management*, 25(6). DOI: 10.1108/EJIM-03-2021–0163.

Say, J.B. (1836). *A Treatise on Political Economy: Or, the Production, Distribution, and Consumption of Wealth*. Philadelphia: Grigg and Elliot.

Shane, S., Venkataraman, S. (2000). The Promise of Entrepreneurship as a Field of Research, *The Academy of Management Review*, 25(1), pp. 217–226.

Silva Júnior, C.R., Siluk, J.C.M., Neuenfeldt Júnior, A., Rosa, C.B., Michelin, C.F. (2022). Overview of the Factors that Influence the Competitiveness of Startups: A Systematized Literature Review, *Gestão and Produção*, 29. DOI: 101590/1806-9649-2022v29e13921.

Sölvell, Ö., Lindqvist, G., Ketels, Ch. (2003). *The Cluster Initiative Greenbook*. Stockholm: Ivory Tower AB.

Stevenson, H.H., Gumpert, D.E. (1985). The Heart of Entrepreneurship, *Research Management*, 28(6), pp. 45–46, http://www.jstor.org/stable/24126771 (accessed: 10.11.2022).

Szerb, L., Lafuente, E., Horváth, K., Páger, B. (2018). The Relevance of Quantity and Quality Entrepreneurship for Regional Performance: The Moderating Role of the Entrepreneurial Ecosystem, *Regional Studies*, 53(9), pp. 1308–1320. DOI: 10.1080/00343404.2018.1510481.

Timmons, J.A., Spinelli, S., Tan, Y. (2004). *New Venture Creation: Entrepreneurship for the 21st Century*, 6. New York: McGraw-Hill/Irwin.

Venkataraman, S. (1997). The Distinctive Domain of Entrepreneurship Research, *Advances in Entrepreneurship, Business Emergence, and Growth*, 3, pp. 119–138.

Wang, Z., Ren, S., Chadee, D., Liu, M., Cai, S. (2021), Team Reflexivity and Employee Innovative Behavior: The Mediating Role of Knowledge Sharing and Moderating Role of Leadership, *Journal of Knowledge Management*, 25(6), pp. 1619–1639.

Weresa, M.A., Kowalski, A.M., Sieńko-Kułakowska, E.B. (2017). *Rozwój klastrów i metody ewaluacji*. Warsaw: SGH Publishing House.

Zorska, A. (2011). Koncepcja twórczej destrukcji J.A. Schumpetera i jej odniesienie do przemian gospodarczych w dobie obecnej rewolucji naukowo-technologicznej. In: *Chaos czy twórcza destrukcja? Ku nowym modelom w gospodarce i polityce* (pp. 19–54), A. Zaorska (Ed.). Warsaw: SGH Publishing House.

Part II

Competitive Position and the Development of Entrepreneurship: Poland and Other European Union Members Compared

Chapter 3

Income Convergence in the European Union and the Pentagon of Competitiveness

Mariusz Próchniak

3.1. Introduction

The purpose of this chapter is to present the historical paths and current macroeconomic performance of the 11 Central and Eastern European (CEE) countries that joined the European Union in 2004, 2007, and 2013, i.e., Poland, Bulgaria, Croatia, Czechia, Estonia, Lithuania, Latvia, Romania, Slovakia, Slovenia, and Hungary (EU-11). As part of the analysis of the development patterns to date, we use the study of income convergence of these countries in relation to the 14 Western European countries that are currently EU member states (EU-14). To analyze current macroeconomic performance, we use the so-called pentagons of competitiveness. This tool allows individual countries to be assessed against five criteria: economic growth, inflation, unemployment, general government balance, and current account balance. These variables represent important areas from the point of view of the state's economic policy, while largely shaping the competitiveness of economies. In analyzing the pentagons of competitiveness, we compare seven CEE countries (four Visegrad Group countries and three Baltic states) with five Western European countries representing three Western European models of capitalism: the Continental model (Germany and France), the Mediterranean model (Spain and Italy), and the Nordic model (Sweden).

The study is a continuation of research on this subject, presented in previous versions of the Report earlier research on income convergence includes studies by Matkowski, Rapacki, and Próchniak [2016a], Próchniak [2017, 2018, 2019, 2020, 2022], while the pentagons of competitiveness were discussed by Matkowski, Rapacki, and Próchniak [2016b] and Rapacki and Próchniak [2017, 2018, 2019a, 2020]. The 2013 edition of the report also includes an analysis of regional convergence covering the regions of all the EU countries [Matkowski, Próchniak, 2013].

3.2. Theoretical background of the analysis of income convergence

Models of economic growth constitute the theoretical framework for the analysis of convergence in the level of income. Neoclassical models of economic growth [e.g., Solow, 1956; Mankiw, Romer, Weil, 1992] confirm the existence of conditional β-convergence. It occurs when less developed countries (with lower GDP per capita) show a faster rate of economic growth than more developed ones. The convergence is conditional because it only occurs when all countries tend to the same long-term equilibrium (steady state). The β-convergence hypothesis can be explained using the Solow model [see, e.g., Rapacki, Próchniak, 2012; Próchniak, Witkowski, 2012].

In the Solow model, the basic equation describing the dynamics of the economy tending to a steady state takes the following form:

$$\dot{k} = sf\left(k\right) - \left(n + a + \delta\right)k, \tag{3.1}$$

where: k – capital per unit of effective labor in year t, $\dot{k}$ – change of k in a time unit (from a mathematical point of view, it is a derivative of k with respect to time), s – savings rate, $f(k)$ – production function (expressed per unit of effective labor), n – population growth rate, a – rate of exogenous technical progress, δ – capital depreciation rate. In the analysis of the Solow model with technical progress, the symbols k and $f(k)$ mean, respectively, capital and output per unit of effective labor, where effective labor is a product of the level of technology and labor input.

If we assume that the production function is of the Cobb-Douglas type with the form $f(k) = k^{\alpha}(0 < \alpha < 1)$, equation (3.1) is transformed to:

$$\dot{k} = sk^{\alpha} - \left(n + a + \delta\right)k. \tag{3.2}$$

By dividing equation (3.2) by k, we obtain a formula for the growth rate of capital per unit of effective labor during the transition period towards the steady state:

$$\frac{\dot{k}}{k} = sk^{\alpha-1} - \left(n + a + \delta\right). \tag{3.3}$$

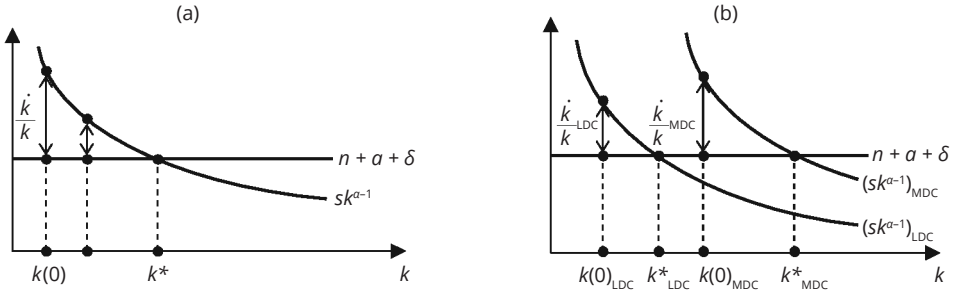
As output is directly proportional to capital, the analogous equation characterizes the dynamics of GDP per unit of effective labor.

The best way to illustrate the convergence hypothesis is to graphically analyze equation (3.3). This is shown in Figure 3.1. The rate of growth is equal to the vertical

distance between the $sk^{\alpha-1}$ curve and the $n + a + \delta$ straight line. As can be seen, the economy, which starts with the initial capital level k (0) and reaches the capital level in long-term equilibrium k^*, shows a decreasing rate of economic growth. The convergence is conditional because it occurs only when both economies tend to the same steady state.

In order to illustrate the conditional character of the convergence phenomenon, let us consider two countries: a more developed country (MDC) and a less developed country (LDC), in which the savings rates are different. Because the savings rate in a more developed country is higher, the capital level in a steady state is also greater. This is illustrated in part (b) of Figure 3.1. Although a more developed country starts from a higher capital base, it shows faster economic growth because it moves toward a different long-term equilibrium. In this situation, convergence will not occur.

Figure 3.1. Economic growth in the Solow model



Source: compiled by author.

An important goal of empirical research is to estimate the value of parameter β, which measures the speed of the convergence process to a steady state, according to the following equation:

$$\frac{\dot{y}}{y} = \beta\left(ln\ y^* - ln\ y\right), \tag{3.4}$$

where: y – output per unit of effective labor in year t, $\dot{y}$ – change of y in time unit (derivative with respect to time), y^* – output per unit of effective labor in steady state.

Parameter β represents the distance which is covered by the economy tending towards the steady state during one period (year). For example, if $\beta = 0.02$, the economy covers 2% of the distance concerned each year.

Another type of catching-up is σ-convergence. It occurs when the income differential between countries decreases over time. The income differential can be measured by

the standard deviation, variance or coefficient of variation of GDP per capita levels between countries or regions.

From a theoretical perspective, σ-convergence is a necessary but insufficient condition of β-convergence. Therefore, it is possible (though unlikely) that the differences in the level of income between economies will be growing over time and at the same time a less developed country will show a faster rate of economic growth. This will happen when the less developed country reaches such a fast rate of economic growth that it outstrips the more developed country in terms of income level and the differences in the development level in the final period will be higher than in the initial one.

To verify the occurrence of absolute β-convergence, we estimate the following regression equation:

$$\frac{1}{T} ln \frac{y_T}{y_0} = \alpha_0 + \alpha_1 ln\ y_0 + \varepsilon_t, \tag{3.5}$$

where y_T and y_0 are income per capita in the final and initial year, while ε_t is a random factor. Thus, the average annual growth rate of real GDP per capita at purchasing power parity (PPP) between period T and 0 is the explained variable, while the natural logarithm of GDP per capita in the initial period is the explanatory variable. If the α_1 parameter is negative and statistically significant (in the empirical analysis, we assumed a significance level of 5%), there is β-convergence. In this situation, we can calculate the value of coefficient β, measuring the speed of convergence:[1]

$$\beta = -\frac{1}{T} ln\left(1 + \alpha_1 T\right). \tag{3.6}$$

In order to verify the occurrence of σ-convergence, we estimate the trend line for the disparity of income levels between countries:

$$sd\left(ln\ y_t\right) = \alpha_0 + \alpha_1 t + \varepsilon_t, \tag{3.7}$$

[1] Barro and Sala-i-Martin [2003, p. 467], when analyzing β-convergence based on the neoclassical model, derive an equation showing the relationship between the average rate of economic growth and the initial level of income:

$$\left(1/T\right)\ln\left(y_{iT}/y_{i0}\right) = a - \left[\left(1 - e^{-\beta T}\right)/T\right]\ln\left(y_{i0}\right) + w_{i0,T},$$

where y_{iT} and y_{i0} – GDP per capita in country i in the final and initial year, T – time period, β-convergence rate, a – constant, $w_{i0,T}$ – random factor. The coefficient at the initial income level, i.e., $-[(1 - e^{-\beta T})/T]$ equals parameter α_1 in formula (11.5). Thus, from the equation $\alpha_1 = -[(1 - e^{-\beta T})/T]$ we obtain formula (10.6). For a small T, estimation of the parameter in regression equation α_1 will be very close to coefficient β, because with T tending to zero the expression $(1 - e^{-\beta T})/T$ tends to β.

where *sd* is the standard deviation, while *t* is time ($t = 1,\ldots, 29$ for the period 1993–2022). Thus, the explained variable is the standard deviation of natural logarithms of GDP per capita levels between countries, while time is the explanatory variable. If the α_1 parameter is negative and statistically significant, there is σ-convergence.

3.3. Income convergence of the EU-11 to the EU-15 – empirical study results

The study covers the period 1993–2022. All calculations were also made for three sub-periods: 1993–2000, 2000–2010 and 2010–2022, which allows the temporal stability of the phenomenon examined to be analyzed. This also makes it possible to approximately determine the strength of impact of many other, deeper factors on the rate of income disparity reduction.

Table 3.1. Results of estimation of regression equations describing β-convergence

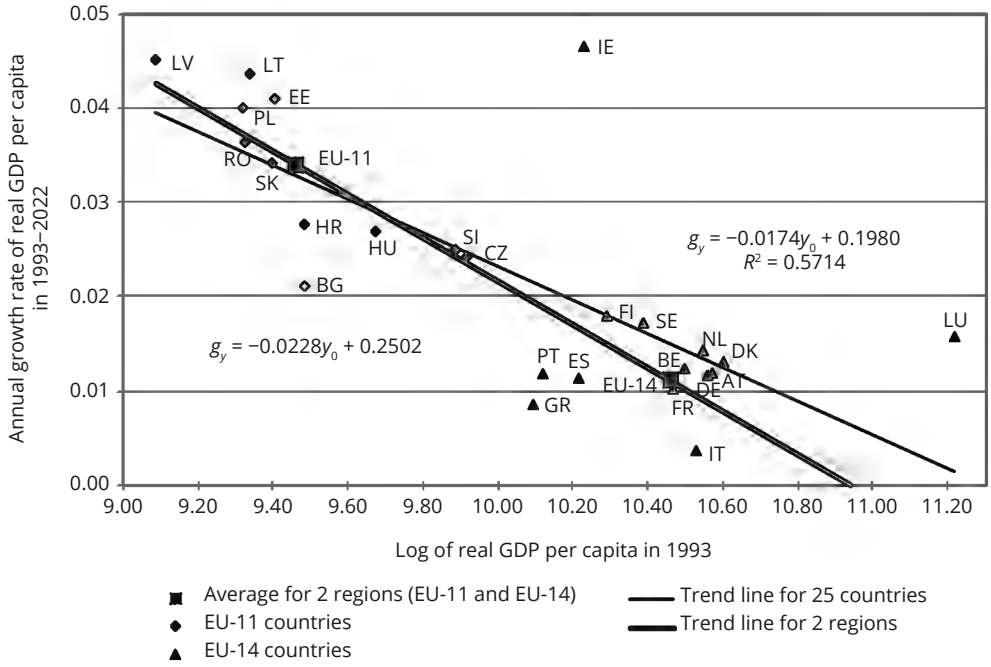
Time period	α_0	α_1	Stat. t (α_0)	Stat. t (α_1)	p-value (α_0)	p-value (α_1)	R^2	β-convergence	β
25 countries of enlarged EU									
1993–2022	0.1980	−0.0174	6.27	−5.54	0.000	0.000	0.5714	yes	1.76%
1993–2000	0.0555	−0.0023	0.73	−0.30	0.470	0.767	0.0039	no	–
2000–2010	0.3030	−0.0274	9.44	−8.76	0.000	0.000	0.7693	yes	2.77%
2010–2022	0.2102	−0.0183	2.96	−2.70	0.007	0.013	0.2405	yes	1.85%
2 regions (EU-11 and EU-14)									
1993–2022	0.2502	−0.0228	–	–	–	–	1.0000	yes	2.31%
1993–2000	0.1222	−0.0093	–	–	–	–	1.0000	yes	0.94%
2000–2010	0.3764	−0.0348	–	–	–	–	1.0000	yes	3.54%
2010–2022	0.4029	−0.0369	–	–	–	–	1.0000	yes	3.76%

Source: compiled by author.

The calculations use time series of real GDP per capita at purchasing power parity (in USD) obtained from the International Monetary Fund data [IMF, 2022].

The results of the β-convergence analysis of the EU-11 to the EU-14 countries are presented in Table 3.1 and in Figure 3.2. Convergence is analyzed both between the 25 EU countries and between two regions covering the EU-11 and EU-14 areas. Aggregated data for two areas, the EU-11 and the EU-14, are weighted averages with variable weights reflecting the population number of a country included in a particular group in a given year.

Figure 3.2. Relationship between the GDP per capita growth rate in 1993–2022 and the level of GDP per capita at the beginning of the period



Source: compiled by author.

The results obtained confirm the existence of strong income convergence of the EU-11 to the EU-15 countries throughout the 1993–2022 period. Convergence occurred both among the 25 countries of the group examined and between the two areas, the EU-11 and EU-14. Countries with lower income levels in 1993 showed, on average, a faster rate of economic growth in 1993–2022 than countries initially better developed. As the group of less developed countries in 1993 consisted of the Central and Eastern Europe countries, these results confirm the clear convergence of the EU-11 countries to the average level of income in Western Europe.

The analysis of Figure 3.2 shows that the distribution of points representing individual countries fits quite well with the negatively sloped trend line. This results in a relatively high value of the determination coefficient at a level close to 60%. Thus, differences in the initial income level account for more than half of the economic growth rate differential in 1993–2022.

Looking at the points representing particular countries, the situation of the individual countries can be compared and, in this perspective, the changes in their competitive position over the whole period can be assessed. The fastest rate of

economic growth among the Central and Eastern European countries was recorded in the Baltic states and Poland. Latvia, Lithuania, Estonia, and Poland showed an average annual economic growth rate of more than 4% in the period 1993–2022, with a relatively low initial income level. Romania and Slovakia also recorded a relatively high rate of economic growth of approx. 3.5%. The performance of those countries strengthened the convergence tendency in the group as a whole. As can be seen, the situation of Poland compared to other countries is favorable. Poland ranked third among the 11 countries of Central and Eastern Europe in terms of the average rate of economic growth in 1993–2022, which was one of the factors behind strengthening the competitive position of the Polish economy.

Aggregated data for two areas, EU-11 and EU-14, also confirm the existence of convergence in 1993–2022. In Figure 3.2, the points representing these two areas are marked with squares. The EU-11 group as a whole showed faster economic growth than the EU-14 with a much lower initial level of income.

The β-coefficients, which measure the speed of the convergence process, amount to 1.76% for the 25 countries and 2.31% for the two areas. They allow the time needed to reduce the development gap between the countries under study to be estimated. Namely, given that the average economic growth rate witnessed over the 1993–2022 period is maintained, the countries of the enlarged EU will need about 30–40 years to halve the distance separating them from the common hypothetical long-term steady state (this result has been calculated as follows: $-ln(0.5)/0.0176 = 39.4$ years and $-ln(0.5)/0.0231 = 30.0$ years). The above results show a slow convergence of the EU-11 countries to Western Europe. Based on these estimates, it is difficult to expect quick levelling out of income differences between Poland as well as other Central and Eastern European and Western Europe in the medium term.

This result should be looked at with some reserve, as it is based on model assumptions which may or may not prove correct in reality. Specifically, it provides for the occurrence of a decreasing marginal productivity of capital (in accordance with the neoclassical production function) as well as the fact that economies tend towards the steady state and will reach that state in infinity. Therefore, in interpreting those results, it makes sense to refer to the half-life instead of the period needed to completely close the income gap. It is worth comparing those results with other forecasts, presented in the SGH Report at the Economic Forum in Krynica-Zdrój, which show that Poland will catch up with Western Europe in a dozen or so years [Próchniak, Lissowska, Maszczyk, Rapacki, Sulejewicz, 2019].

It is worth looking at the stability of the convergence processes over time. It turns out that in the identified sub-periods the speed of convergence was highly diversified. The high instability of the convergence rate in the countries under study was caused,

inter alia, by the global crisis, and by diverse impacts of institutional factors on economic growth, related, e.g., to EU membership. For the 25 EU countries, in the years 1993–2000, there was no statistically significant reduction in the income gap between the EU-11 and the EU-14 countries (in average terms for the whole group). For the years 1993–2000, the slope of the trend line was negative but not statistically significant. Such estimation results of the model in fact show a lack of convergence, despite the negative slope of the trend line. A very strong acceleration of the convergence rate occurred between 2000 and 2010, which undoubtedly had its source in the EU enlargement.[2] The clear tendency towards convergence witnessed in the 2000s declined steeply in the 2010s. This was largely attributable to the crises in the wake of the COVID-19 pandemic and the war in Ukraine, and the interruption of prior stable paths of economic growth in the countries concerned.

The β-convergence results presented here are averaged values for the entire region. As can be seen in Figure 3.2, individual CEE countries showed different dynamics of economic growth and different degrees of convergence to Western Europe. It is worth analyzing the status of convergence of the particular EU-11 countries relative to the EU-14 in the identified sub-periods.

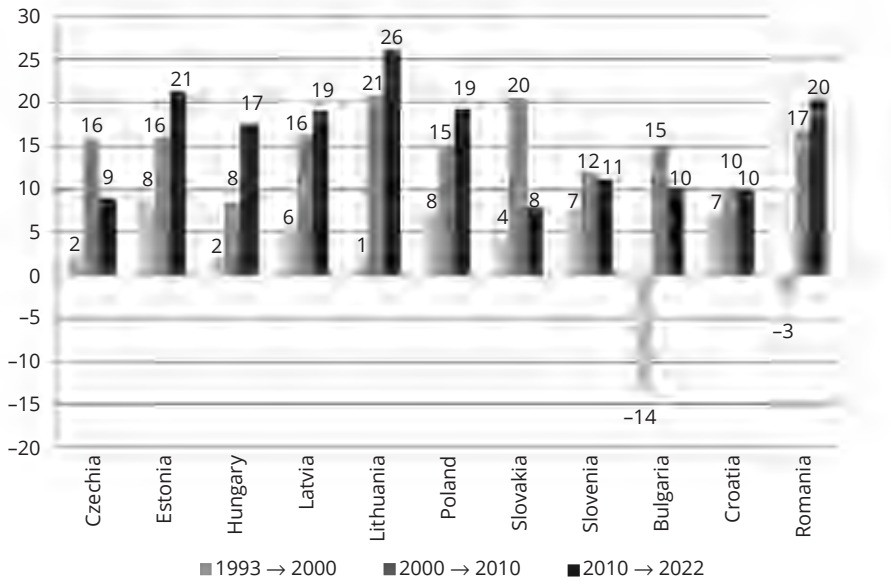
Figure 3.3 shows a decrease in income gap (in percentage points) of a given EU-11 country in relation to the EU-14 area in the years 1993–2000, 2000–2008, and 2008–2022. The data presented in the figure partly confirms the conclusions of the β-convergence analysis. Namely, all the countries saw the slowest pace of closing the income gap in the first identified sub-period, i.e., 1993–2000. What is more, in those years two countries (Bulgaria and Romania) even saw an increased development gap with Western Europe. The unusual behavior of Bulgaria and Romania resulted partly from the fact that the "integration anchor" related to EU enlargement started to work later in those countries than in other CEE states (except Croatia, which was the last country to join the EU). Between 1993 and 2000 Poland edged 8 p.p. closer to the 14 Western European states to become a leader in this respect (jointly with Estonia).

After 2000, the rate of catching up accelerated across the EU-11. Most CEE countries narrowed the income gap with the EU-14 by 10 p.p. or more both in the 2000s and 2010s. The leader was Lithuania, which caught up by 21 p.p. with Western Europe in terms of the development divide between 2000 and 2010 and by 26 p.p. between 2010 and 2022. Estonia, Latvia, and Romania also led the way in this respect, narrowing the distance to the EU-14 over the first two decades of the 21st century by 16 and 21 p.p. (Estonia), 16 and 19 p.p. (Latvia), 15 and 19 p.p. (Poland), and 17 and 20 p.p. (Romania), respectively.

[2] The positive impact of EU membership on economic growth of the 11 CEE countries is also confirmed in an article by Rapacki and Próchniak [2019b].

For Poland, an important role in accelerating the pace of convergence after the EU enlargement was played by the European funds, which increased the competitiveness of the country's economy. Poland was the largest beneficiary of the EU funds under the 2007–2013 budget. The stream of funding from the EU under various support schemes positively influenced the growth of the Polish economy on the demand and supply sides, thanks to which Poland has performed relatively well in terms of economic growth in recent years (e.g., it was the only EU country to avoid recession during the last global financial crisis). The EU budget for 2014–2020 and the continuation of a large influx of structural funds to the new member states is also one of the factors conducive to maintaining the pace of Poland's convergence to Western Europe in the last analyzed sub-period.

Figure 3.3. Extent of income gap closing between the EU-11 and the EU-14 countries in three consecutive subperiods (p.p.)



Notes: for each year the EU-14 GDP per capita at PPP is taken as 100.

Source: compiled by author based on IMF [2022].

The expansive fiscal and monetary policy pursued by the government and central bank in Poland over the last few years has also been conducive to strong economic growth despite the COVID-19 pandemic. Large infrastructure projects, including the continued construction of motorways and expressways (e.g., Via Baltica and Via Carpatia), railway line upgrades and purchase of new rolling stock, the Vistula Split canal project, or the construction of the Świnoujście Tunnel, as well as large social

schemes resulting in an increase of household disposable income are only some examples of projects driving the Polish economy.

Consequently, Poland ranks fifth among the EU-11 countries in terms of relative income per capita (measured at PPP). According to October 2022 IMF data, in 2022 Poland's GDP per capita represented 74% of the average income per inhabitant of Western Europe (EU-14). Results better than Poland's are boasted by Slovenia (87%), Czechia (85%), Lithuania and Estonia (80% each). This marks a significant improvement from data reported several years ago, when Poland was trailing the group. Hopefully, despite the persisting COVID-19 pandemic, the favorable development trends will be continued by Poland and in the years ahead the country will be further catching up with Western Europe.

The σ-convergence of the Central and Eastern European countries to Western Europe is measured by changes in the standard deviation of the natural logarithms of GDP per capita between the 25 EU countries, as well as between the two areas, the EU-11 and the EU-14. The results of the trend line estimation for standard deviations are presented in Table 3.2, and Figure 3.4 contains a graphical presentation of the results.

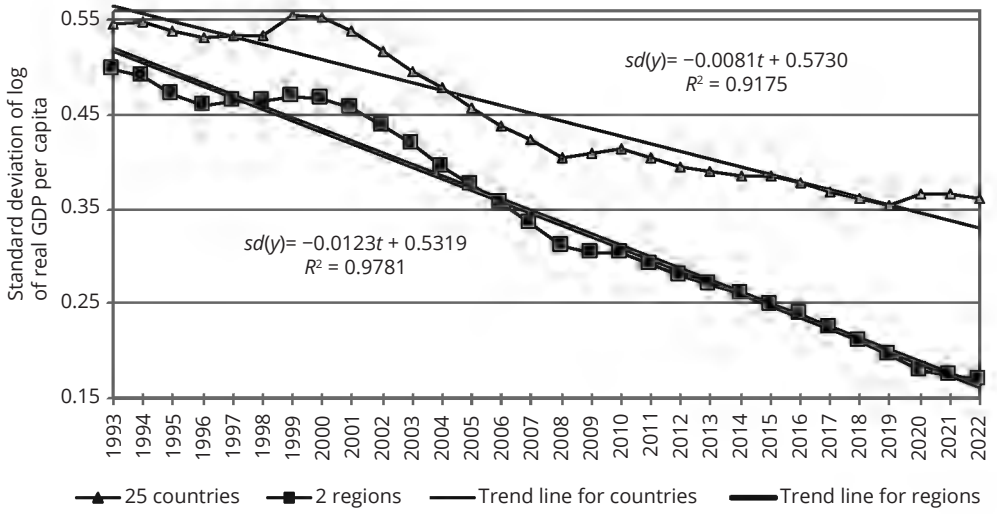
The data contained in Table 3.2 shows that for the whole period there was σ-convergence both among the 25 EU member states and between the EU-11 and the EU-15. The slopes of both estimated trend lines are negative and statistically significant at very high significance levels (as demonstrated by *p*-values equal to 0.000). High values of determination coefficients (over 90%) show a very good fit of empirical points to the trend line.

Table 3.2. Results of estimation of regression equations describing σ-convergence

Time period	α_0	α_1	Stat. *t* (α_0)	Stat. *t* (α_1)	*p*-value (α_0)	*p*-value (α_1)	R^2	σ-convergence
25 countries of enlarged EU								
1993–2022	0.5730	−0.0081	70.45	−17.64	0.000	0.000	0.9175	yes
1993–2000	0.5387	0.0009	73.70	0.62	0.000	0.560	0.0597	no
2000–2010	0.5614	−0.0162	66.36	−12.98	0.000	0.000	0.9493	yes
2010–2022	0.4093	−0.0044	103.56	−8.77	0.000	0.000	0.8748	yes
2 regions (EU-11 and EU-14)								
1993–2022	0.5319	−0.0123	85.91	−35.39	0.000	0.000	0.9781	yes
1993–2000	0.4934	−0.0042	63.69	−2.76	0.000	0.033	0.5588	yes
2000–2010	0.4888	−0.0183	95.26	−24.18	0.000	0.000	0.9848	yes
2010–2022	0.3168	−0.0118	142.00	−41.92	0.000	0.000	0.9938	yes

Source: compiled by author.

Figure 3.4. Standard deviation of GDP per capita in 1993–2022



Source: compiled by author.

Figure 3.4 shows the tendency of standard deviation of log GDP per capita levels. As can be seen, the income differential between the new and the old EU countries showed, in general, a downward trend. The most visible and steady decrease in income disparities occurred in the second part of the analyzed period, i.e., from 2000 onwards. In 2009 and 2010 – as a result of the global economic crisis and declining GDP growth rate in many previously fast-developing countries – income disparities increased among the 25 countries of the group under study. A tendency towards divergence in the EU-25 was also witnessed in 2020 as a result of the coronavirus pandemic and then maintained by the energy crisis and the war in Ukraine, although this is not confirmed by averaged data for the two areas.

A comparison of the results we have obtained with those from other analyses shows that there are many empirical studies on the phenomenon of convergence, and it is impossible to list them all here. A detailed review of the latest empirical research includes the article by Matkowski, Rapacki, and Próchniak [2016c]. Books by Malaga [2004], Michałek, Siwiński, and Socha [2007], Liberda [2009], Batóg [2010], Próchniak and Witkowski [2016], Jóźwik [2017], and Kotliński and Warżała [2020] are entirely or largely devoted to the phenomenon of convergence in the countries of the European Union or the OECD. For their part, books by Wójcik [2018] and Bernardelli, Próchniak, and Witkowski [2021] provide certain innovative approaches to measuring the convergence process, together with an extensive empirical analysis.

Comparing the results obtained here with the literature, it should be added that in recent years studies suggesting the possibility of divergence in Europe (both at the national and regional level) have been increasingly frequent. For example, Mucha [2012] suggests that for some euro area countries having a single currency may be a source of many problems and cause the emergence of economic divergence from other members of the Economic and Monetary Union. Monfort, Cuestas, and Ordóñez [2013] analyze the real convergence of GDP per worker in 23 EU countries in 1980–2009 (Western European countries) and 1990–2009 (Central and Eastern European countries), showing that – using the club convergence research techniques – there is a strong case for the existence of per capita income divergence in the EU as a whole; however, for example, the countries of Central and Eastern Europe (excluding Czechia but including Greece) form a group showing convergence. Borsi and Metiu [2013] analyze the real convergence of the 27 EU countries in the years 1970–2010, reaching the conclusion that there is no convergence of per capita income levels in the whole group and that convergence does exist in the subgroups of countries that tend to different steady states. Staňisić [2012] analyzes β-convergence in the EU-25 and within two groups of countries, the EU-15 and the EU-10, confirming the existence of β-convergence in the EU-25 (which means the convergence of the new EU member states to Western Europe) and denying the convergence within the EU-15 and the EU-10. The author of the quoted study also claims that during the recent crisis income disparities between the EU-25 countries increased, but the scale and time range of that increase were limited and did not affect the long-term convergence path, which is a conclusion similar to the results of our study.

It is therefore clear that the convergence process is not an automatic phenomenon. Despite the strong tendency of decreasing income disparities between Central and Eastern Europe and Western Europe in recent years, there is no guarantee that this situation will persist in the future (as evidenced by the temporal instability of our results and increasingly frequent references in the literature to the possibility of divergence tendencies emerging in Europe). Thus, it is an extremely important task for economic policymakers to pursue measures to maintain the current long-term trends of economic growth in Europe, characterized by reducing the income differences between the eastern and western areas of the continent.

3.4. Pentagons of competitiveness

To assess the current macroeconomic performance, we will use the so-called pentagons of competitiveness.[3] They enable a comparative analysis of countries based on five commonly used variables representing the condition of the economy:

a) economic growth rate,
b) unemployment rate,
c) inflation rate,
d) general government balance,
e) current account balance.

The general condition of the Polish economy will be compared with the situation of six other CEE countries: three Visegrad Group member states (Czechia, Slovakia, Hungary) and five Western European countries: Germany, France, Italy, Spain, and Sweden. The selected countries of Western Europe are representatives of three models of Western European capitalism, according to the classification proposed by Amable [2003]. German and France represent the Continental model, Spain and Italy are representatives of the Mediterranean model, and Sweden reflects the Nordic (or Scandinavian) model. The analysis leaves out the Anglo-Saxon (liberal) model, whose flagship representative (the United Kingdom) is no longer a member of the European Union.

The data concerning five indicators describing the overall macroeconomic performance of Poland and the reference countries in 2022 are provided in Table 3.3. All the data are preliminary estimates. At the time of writing this chapter (October 2022), we have no complete 2022 data available and must rely on estimates. The analysis draws on the International Monetary Fund's data, which are the most up to date (October 2022) at the time of writing this paper. Having at the same time taken into consideration the dynamic changes in the geopolitical situation in Europe, caused by the war in Ukraine and the rising energy prices, we chose not to present the pentagons of competitiveness for 2021, as the data will be much out of date when the Report is published (2023) and will then only have a historical value.

Figure 3.5 presents the pentagons of competitiveness. They illustrate the extent to which five key macroeconomic objectives have been achieved:

a) economic growth,
b) full employment,

[3] The author of the concept of this type of pentagons is Zbigniew Matkowski. A detailed description of the concept of pentagons and their interpretation is provided in previous editions of the report [see, e.g., Matkowski, Rapacki, Próchniak, 2016b].

c) internal equilibrium (no inflation),
d) public finance equilibrium,
e) external equilibrium.

The degree of achieving the above objectives is represented by the variables on the axes of the pentagons.

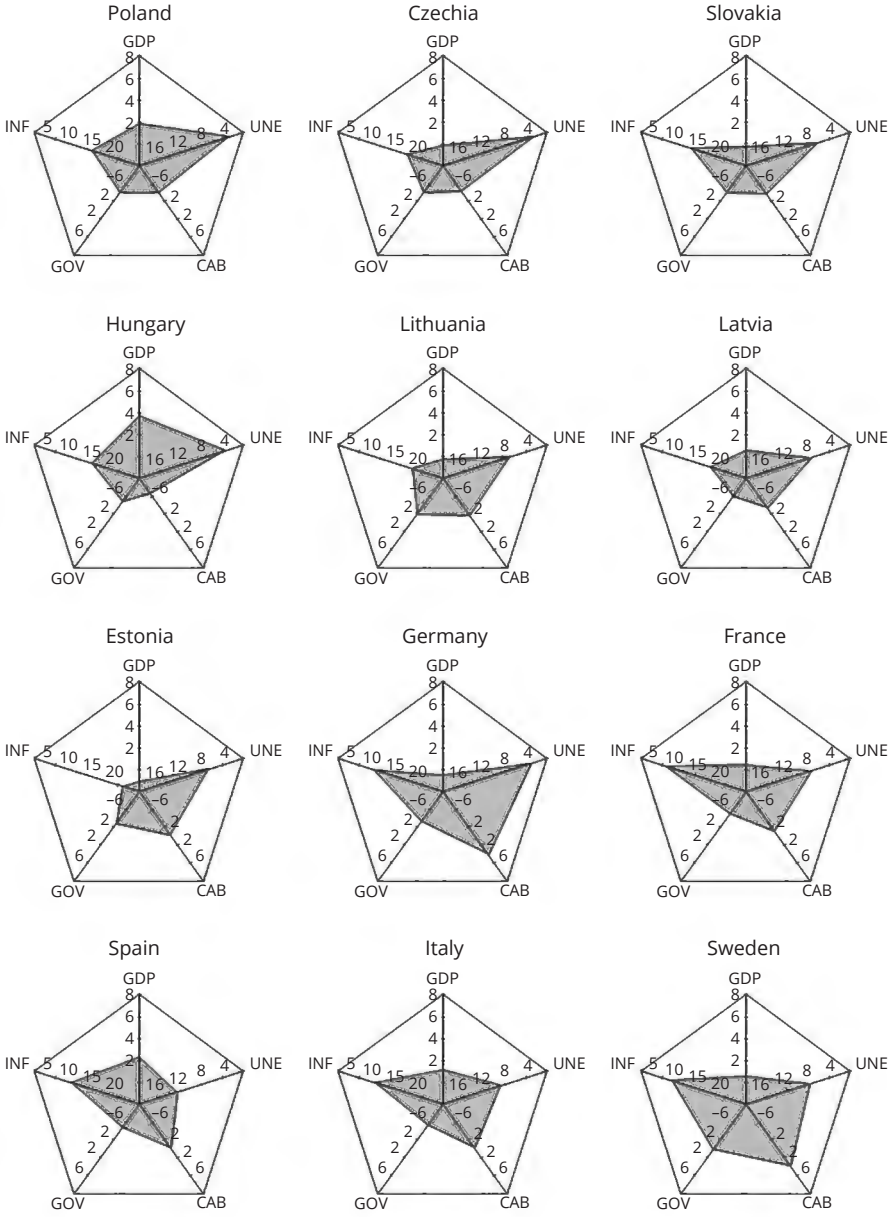
The pentagon tips expressing the maximum or minimum values of each variable are treated as desirable (positive) targets, although this may sometimes be debatable. For example, a large current account surplus or government budget surplus may not be an optimal outcome, as is the case with zero inflation or zero unemployment. Interdependence is another problem, especially conflicts between various macroeconomic targets, e.g., the fact that low unemployment (according to the Phillips curve) is often accompanied by high inflation and vice versa. The relative significance of individual criteria (e.g., whether low inflation is as important as low unemployment) is a separate issue. All these reservations must be taken into account in interpreting the charts.

Table 3.3. Main macroeconomic indicators in Poland and selected EU countries in 2022

Country	GDP growth (%)	Inflation (%)	Unemployment (%)	General government balance (GDP %)	Current account balance (GDP %)
Central and Eastern European countries					
Poland	**3.8**	**13.8**	**2.8**	**−4.1**	**−4.0**
Czechia	1.9	16.3	2.5	−4.0	−4.3
Slovakia	1.8	11.9	6.2	−4.0	−3.7
Hungary	5.7	13.9	3.4	−4.9	−6.7
Lithuania	1.8	17.6	7.3	−2.0	−1.6
Latvia	2.5	16.5	7.4	−6.0	−3.3
Estonia	1.0	21.0	6.6	−2.9	−0.2
Western European countries					
Germany	1.5	8.5	2.9	−3.3	4.2
France	2.5	5.8	7.5	−5.1	−1.3
Spain	4.3	8.8	12.7	−4.9	−0.2
Italy	3.2	8.7	8.8	−5.4	−0.2
Sweden	2.6	7.2	7.6	0.1	3.8

Notes: all data are estimated; the inflation data represent the annual average growth rate of consumer prices.
Source: IMF [2022].

Figure 3.5. Macroeconomic performance of Poland and selected other EU member states in 2022



Legend:
GDP – GDP growth rate (%),
INF – inflation rate (%),
UNE – unemployment rate (%),
GOV – general government balance (% of GDP),
CAB – current account balance (% of GDP).

Source: compiled by author based on data from Table 3.3.

When comparing the pentagons representing the economic performance of various countries in a particular year, both the marked surface of a pentagon and its shape must be taken into account. A larger surface area of the pentagon indicates a better general performance of the economy, and its more harmonious shape indicates a more balanced growth. Of course, such an assessment is based solely on the five aforementioned macroeconomic criteria describing the current condition of the economy. It does not provide information on the size of an economy, its economic potential and development prospects. It does not even say much about a country's possible economic situation in the subsequent year, although a good current condition of the economy increases its chances for remaining on the sustainable development path in the near future as well. Nevertheless, the analyses based on this method should be interpreted with caution.

In 2022, the overall macroeconomic situation of the Central and Eastern European countries was poor. The CEE group as a whole recorded a relatively low rate of economic growth, although, on the positive side, none of the CEE countries plunged into recession. High inflation was another problem. All Visegrad Group countries and the Baltic states recorded two-digit inflation, and in Estonia it even spiked above 20% (according to preliminary estimates). Such a rapid growth of prices is undoubtedly the result of the war in Ukraine and the energy crisis caused by constraints in the supply of energy resources and the increase in their prices. A large general government deficit, in most cases exceeding 3% of GDP, is also worrying. At the same time, the CEE countries recorded a current account deficit. On the other hand, the new EU member states have performed relatively well in terms of the unemployment rate. In all seven CEE countries presented on the competitiveness pentagons, the unemployment rate was in single digits.

A comparison of the general condition of the CEE economies to the countries of Western Europe, reveals one striking difference. Namely, the inflation rate in Western European countries is much lower. Germany, France, Spain, Italy and Sweden recorded single-digit inflation (according to preliminary estimates). Such large and regular differences between the inflation rates in both groups of countries are due to the energy crisis and Russia's invasion of Ukraine. The CEE countries were much more dependent on Russia for the import of energy resources, so any restrictions and interruptions in oil and gas supplies had a highly negative impact on the economic situation in the CEE region, especially on the inflation rate. Western European countries were more independent from Russia when it comes to energy imports, so they were less adversely affected by the increase in energy prices.

Despite the generally weak economic condition of the countries of Central and Eastern Europe, Poland's situation is good in relative terms compared to the entire

group. In 2022, Poland recorded a relatively fast pace of production growth. According to the IMF's October 2022 estimates, in 2022 the GDP growth rate in Poland was to be 3.8%. Faster GDP growth is forecast for Hungary (5.7%), and among Western European countries – for Spain (4.3%). Inflation in Poland, although high, is estimated to be relatively low compared to other CEE countries. According to the IMF forecast, in 2022, the price growth rate in Poland will amount to 13.8% on average annually. Out of the CEE countries analyzed on the pentagons of competitiveness, only Slovakia is expected to perform better (11.9%) and Hungary slightly worse (13.9%). On the other hand, the forecast inflation for Czechia, Lithuania, Latvia, and Estonia is much higher (over 16%). Unemployment is very low in Poland. The unemployment rate is estimated to be 2.8% in Poland in 2022. Of the CEE and Western European countries, only Czechia has performed better (2.5%). On the other hand, when it comes to the general government balance and the current account balance, Poland has recorded deficits of about 4% of GDP, which is comparable to other CEE countries' performance.

3.5. Conclusions

In the group of 25 countries of the enlarged European Union, income convergence occurs both in terms of β- and σ-convergence concepts. The rate of economic growth in 1993–2022 was negatively dependent on the initial level of GDP per capita. The new EU member states from Central and Eastern Europe achieved a faster rate of economic growth than the Western European countries, although the initial level of GDP per capita was much lower in the CEE countries. Disparities in the level of income decreased, especially after 2000, but they are still very large.

Therefore, no reduction in the differences in competitiveness measured by the standard of living of the societies of the old and new EU member states can be unconditionally expected in the short term. Acceleration of the convergence process will depend, among other things, on a properly conducted economic policy aimed at reducing differences in the level of development between Central and Eastern Europe and Western Europe. The coronavirus pandemic, the war in Ukraine, and the energy crisis will also have a significant impact on future economic growth. They carry the risk of significantly weakening convergence and even the appearance of divergence tendencies in the future. Hopefully, such a pessimistic scenario will not come true and the CEE countries will continue along the path of rapid economic growth and bridging the developmental gap with Western Europe.

In terms of the five main macroeconomic indicators characterizing the general performance of the economy, Poland's results in 2022 were relatively good compared

to other CEE countries, despite the fact that the group as a whole (including Poland) recorded poor results in absolute terms. According to IMF estimates from October 2022, Poland will achieve relatively good ratings in 2022 compared to the other Visegrad Group countries and the Baltic states in terms of economic growth rate, inflation rate, and unemployment rate. Of course, this result should be viewed in relative terms – double-digit inflation and a high general government deficit are the biggest problems currently facing the Polish economy.

Bibliography

Amable, B. (2003). *Diversity of Modern Capitalism*. Oxford: Oxford University Press.

Barro, R., Sala-i-Martin, X. (2003). *Economic Growth*. Cambridge–London: The MIT Press.

Batóg, J. (2010). *Konwergencja dochodowa w krajach Unii Europejskiej.* Szczecin: Wydawnictwo Naukowe Uniwersytetu Szczecińskiego.

Bernardelli, M., Próchniak, M., Witkowski, B. (2021). *Economic Growth and Convergence. Global Analysis through Econometric and Hidden Markov Models*. London–New York: Routledge.

Borsi, M.T., Metiu, N. (2013). The Evolution of Economic Convergence in the European Union, *Deutsche Bundesbank Discussion Paper*, 28.

IMF (2022). *World Economic Outlook Database. October 2022*, www.imf.org (accessed: 25.10.2022).

Jóźwik, B. (2017). *Realna konwergencja gospodarcza państw członkowskich Unii Europejskiej z Europy Środkowej i Wschodniej. Transformacja, integracja i polityka spójności*. Warsaw: Wydawnictwo Naukowe PWN.

Kotliński, K., Warżała, R. (2020). *Euro a proces konwergencji państw Europy Środkowo-Wschodniej. Próba oceny*. Olsztyn: Instytut Badań Gospodarczych.

Liberda, Z.B. (2009). *Konwergencja gospodarcza Polski*. Warsaw: Polskie Towarzystwo Ekonomiczne.

Malaga, K. (2004). *Konwergencja gospodarcza w krajach OECD w świetle zagregowanych modeli wzrostu*. Poznań: Wydawnictwo Akademii Ekonomicznej.

Mankiw, N.G., Romer, D., Weil, D.N. (1992). A Contribution to the Empirics of Economic Growth, *Quarterly Journal of Economics*, 107, pp. 407–437.

Matkowski, Z., Próchniak, M. (2013). Real Income Convergence. In: *Poland: Competitiveness Report 2013. National and Regional Dimensions* (pp. 44–64), M.A. Weresa (Ed.). Warsaw: SGH Publishing House.

Matkowski, Z., Rapacki, R., Próchniak, M. (2016a). Income Convergence in Poland vis-à-vis the EU: Major Trends and Prospects. In: *Poland: Competitiveness Report 2016. The Role of Economic Policy and Institutions* (pp. 37–55), M.A. Weresa (Ed.). Warsaw: SGH Publishing House.

Matkowski, Z., Rapacki, R., Próchniak, M. (2016b). Comparative Economic Performance: Poland and the European Union. In: *Poland: Competitiveness Report 2016. The Role of Economic Policy and Institutions* (pp. 11–36), M.A. Weresa (Ed.). Warsaw: SGH Publishing House.

Matkowski, Z., Rapacki, R., Próchniak, M. (2016c). Real Income Convergence between Central Eastern and Western Europe: Past, Present, and Prospects, *Ekonomista*, 6, pp. 853–892.

Michałek, J.J., Siwiński, W., Socha, M. (2007). *Polska w Unii Europejskiej – dynamika konwergencji ekonomicznej*. Warsaw: Wydawnictwo Naukowe PWN.

Monfort, M., Cuestas, J.C., Ordóñez, J. (2013). Real Convergence in Europe: A Cluster Analysis, *Economic Modelling*, 33, pp. 689–694.

Mucha, M. (2012). Mechanizm dywergencji gospodarczej w strefie euro, *Ekonomista*, 4, pp. 487–498.

Próchniak, M. (2017). Income Convergence Between the CEE Region and Western Europe. In: *Poland: Competitiveness Report 2017. Internationalization and Poland's Competitive Position* (pp. 29–40), M.A. Weresa (Ed.). Warsaw: SGH Publishing House.

Próchniak, M. (2018). Convergence of Income Levels Between East-Central and Western Europe. In: *Poland: Competitiveness Report 2018. The Role of Cities in Creating Competitive Advantages* (pp. 29–42), M.A. Weresa, A.M. Kowalski (Eds.). Warsaw: SGH Publishing House.

Próchniak, M. (2019). Income Convergence of Poland to the Average EU Level in the Context of Digital Competitiveness. In: *Poland: Competitiveness Report 2019. International Competitiveness in the Context of Development of Industry 4.0* (pp. 85–98), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Próchniak, M. (2020). Income Convergence of Poland to the Average EU Level. In: *Poland: Competitiveness Report 2020. Focus on Service Sector* (pp. 67–80), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Próchniak, M. (2022). Poland's Income Convergence Toward the EU Average. In: *Poland: Competitiveness Report 2022. Towards a Sustainable Economy in a Pandemic Era* (pp. 155–170). A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Próchniak, M., Lissowska, M., Maszczyk, P., Rapacki, R., Sulejewicz, A. (2019). Wyrównywanie luki w poziomie zamożności między Europą Środkowo-Wschodnią a Europą Zachodnią. In: *SGH Report for the 29th Economic Forum. Europa Środkowo-Wschodnia wobec globalnych trendów: gospodarka, społeczeństwo i biznes* (pp. 13–43), M. Strojny (Ed.). Warsaw: SGH Publishing House.

Próchniak, M., Witkowski, B. (2012). Real Economic Convergence and the Impact of Monetary Policy on Economic Growth of the EU Countries: The Analysis of Time Stability and the Identification of Major Turning Points Based on the Bayesian Methods, *National Bank of Poland Working Paper*, 137.

Próchniak, M., Witkowski, B. (2016). *Konwergencja dochodowa typu beta w ujęciu teoretycznym i empirycznym*. Warsaw: SGH Publishing House.

Rapacki, R., Próchniak, M. (2012). Wzrost gospodarczy w krajach Europy Środkowo-Wschodniej na tle wybranych krajów wschodzących, *Gospodarka Narodowa. The Polish Journal of Economics*, 1–2, pp. 65–96.

Rapacki, R., Próchniak, M. (2017). Comparative Assessment of Development Trends in 2010–2016: Poland and the European Union. In: *Poland: Competitiveness Report 2017. Internationalization and Poland's Competitive Position* (pp. 13–28), M.A. Weresa (Ed.). Warsaw: SGH Publishing House.

Rapacki, R., Próchniak, M. (2018). Comparative Assessment of Development Trends in 2010–2016: Poland and the EU. In: *Poland: Competitiveness Report 2018. The Role of Cities in Creating Competitive Advantages* (pp. 13–28), M.A. Weresa, A.M. Kowalski (Eds.). Warsaw: SGH Publishing House.

Rapacki, R., Próchniak, M. (2019a). Development of the Polish Economy in 2010–2018 Compared with Other EU Countries. In: *Poland: Competitiveness Report 2019. International Competitiveness in the Context of Development of Industry 4.0* (pp. 69–84), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Rapacki, R., Próchniak, M. (2019b). EU Membership and Economic Growth: Empirical Evidence for the CEE Countries, *European Journal of Comparative Economics*, 16(1), pp. 3–40.

Rapacki, R., Próchniak, M. (2020). Development of the Polish Economy in 2010–2019 Compared with Other EU Countries and Selected Emerging Markets, with a Particular Focus on the Service Sector. In: *Poland: Competitiveness Report 2020. Focus on Service Sector* (pp. 45–66), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Solow, R.M. (1956). A Contribution to the Theory of Economic Growth, *Quarterly Journal of Economics*, 70, pp. 65–94.

Staňisić, N. (2012). The Effects of the Economic Crisis on Income Convergence in the European Union, *Acta Oeconomica*, 62, pp. 161–182.

Wójcik, P. (2018). *Metody pomiaru realnej konwergencji gospodarczej w ujęciu regionalnym i lokalnym. Konwergencja równoległa*. Warsaw: Wydawnictwa Uniwersytetu Warszawskiego.

Chapter 4

Entrepreneurship in Poland in Comparison with the European Union: Current State and Prospects for Development

Artur Franciszek Tomeczek

4.1. Introduction

Poland has experienced rapid growth in entrepreneurship since it acceded to the European Union (EU) on May 1, 2004. The scientific aim of this research is to show the state and prospects of entrepreneurship in Poland, contrasted with other European countries. The exploration of European entrepreneurship presented in this chapter is divided into four main themes: business demography, productivity, enterprise financing, and skill mismatch. The countries are selected based on the data available for specific metrics. Most of the analyzed data are taken from the Organisation for Economic Co-operation and Development (OECD). The vertical and horizontal skill mismatch data come from Eurostat's experimental statistics.

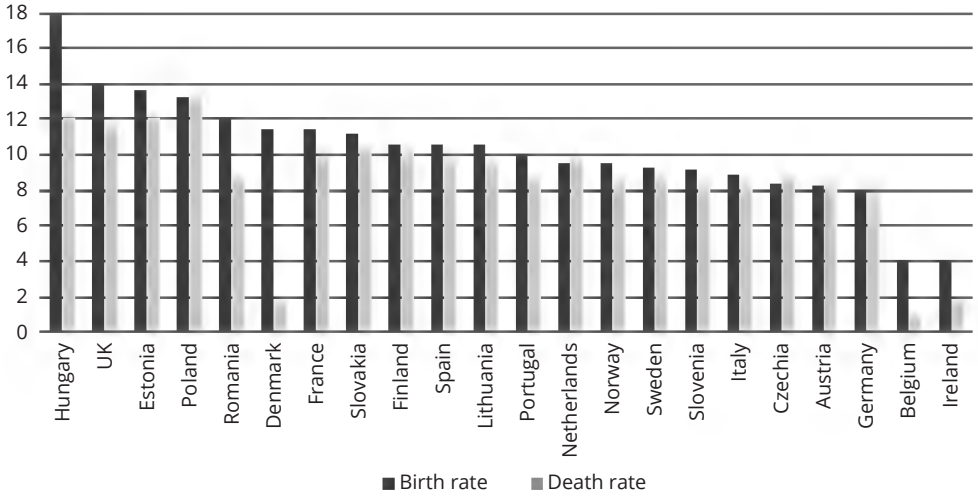
4.2. Business demography

A key element of business demography analysis is the importance of start-ups. The lean start-up approach is based on learning, tests, and rapid iterations [Balocco, Cavallo, Ghezzi, Berbegal-Mirabent, 2019; Bortolini, Nogueira Cortimiglia, Danilevicz, Ghezzi, 2021; Ghezzi, 2019; Ghezzi, Cavallo, 2020; Harms, Schwery, 2020; Ries, 2011]. Adler, Florida, King, and Mellander [2019] show that Schumpeterian tech start-up entrepreneurship is heavily clustered in specific districts of a few influential global cities (e.g., San Francisco, San Jose, and Boston). Clusters and formalized cluster initiatives are quite common in Poland [Kowalski, Marcinkowski, 2014]. Rok and Kulik find that circular start-ups in Poland "(…) are driven by three types of transition: from sustainability to circularity; from a sustainable entrepreneurship towards

positive impact start-ups; and from sustainable innovation to circular business model innovation" [2021, s. 352].

Figure 4.1 shows the birth rate and death rate of firms in selected European countries. OECD defines the birth rate of enterprises as the "number of enterprise births in the reference period (*t*) divided by the number of enterprises active in it". Employer enterprises are enterprises that employ at least one person. A similar definition is used for the death rate (substitute births for deaths for death rate). The data is pre-pandemic and the death rates for those years would significantly increase in most cases. Bankruptcies of inefficient firms and new ones taking their place can be interpreted as a form of Schumpeterian creative destruction [Schumpeter, 1994]; however, it is only valid to do so if productivity gains follow.

Figure 4.1. Birth rate and death rate of employer enterprises in 2018 (%, excluding holding companies)



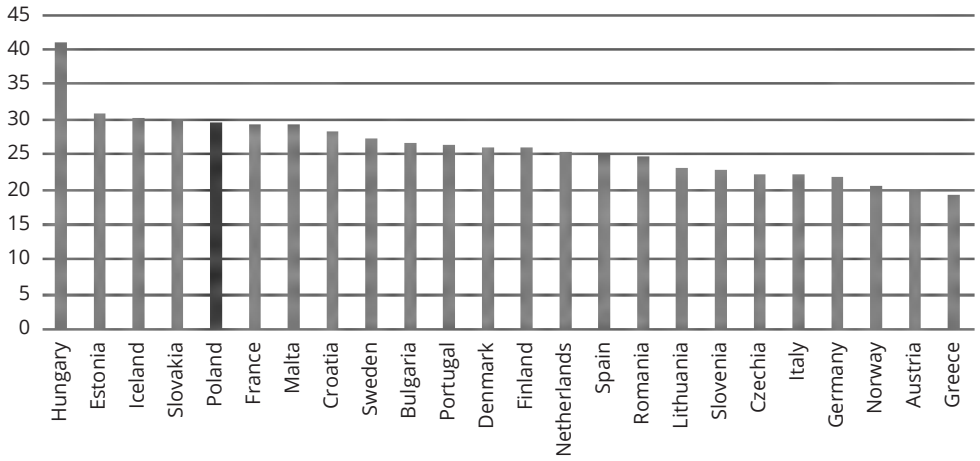
Source: OECD [2022].

The birth rate of enterprises is the highest in Hungary (17.8%), the United Kingdom (13.9%), Estonia (13.5%), Poland (13.1%), and Romania (12%). The death rate is the highest in Poland (13.1%), Estonia (12%), Hungary (12%), the United Kingdom (11.5%), and Slovakia (10.2%). Most countries have a small surplus of births over deaths, however, there are some outliers. For example, Czechia and the Netherlands have a slightly shrinking population of firms. Additionally, the difference between both rates is very high in Denmark at 9.8 p.p., while births and deaths are equal in Poland.

Employer start-ups are defined as enterprises that are 0 to 2 years old and employ at least one person (Figure 4.2). The share of start-ups among employers is the highest

in Hungary (40.7%), Estonia (30.7%), Iceland (30.2%), Slovakia (29.7%), and Poland (29.5%). Hungary's rank in this metric corresponds to its high enterprise birth rate.

Figure 4.2. Share of employer start-ups among active employer enterprises in 2019 (%, excluding holding companies)



Source: OECD [2022].

Table 4.1 gives the data for the number of enterprises in selected European countries in 2019 by size class. SMEs (small and medium-sized enterprises) are defined by OECD as enterprises with 1 to 249 persons employed. Large enterprises are defined as enterprises with 250 or more persons employed. Figure 4.3 represents the number of enterprises in Poland by size class from 2009 to 2019.

Table 4.1. Number of enterprises in 2019 (business economy, except financial and insurance activities)

Country	Size class	Number	Change 2009–2019 (%)	Country	Size class	Number	Change 2009–2019 (%)
Austria	SMEs	328 472	14.0	Lithuania	SMEs	217 147	95.5
Austria	large	1208	20.1	Lithuania	large	376	35.7
Belgium	SMEs	669 071	40.8	Luxembourg	SMEs	35 004	27.1
Belgium	large	994	23.3	Luxembourg	large	173	21.8
Bulgaria	SMEs	344 423	10.2	Netherlands	SMEs	1 282 710	108.2
Bulgaria	large	696	−1.8	Netherlands	large	1800	14.9
Czechia	SMEs	1 048 990	11.8	Norway	SMEs	298 365	11.6
Czechia	large	1656	22.4	Norway	large	635	15.0

cont. table 4.1

Country	Size class	Number	Change 2009–2019 (%)	Country	Size class	Number	Change 2009–2019 (%)
Denmark	SMEs	226 251	10.9	Poland	SMEs	1 999 260	40.6
Denmark	large	713	23.6	Poland	large	3284	6.7
Estonia	SMEs	81 657	62.7	Portugal	SMEs	924 469	2.6
Estonia	large	163	4.5	Portugal	large	986	22.3
Finland	SMEs	230 702	3.8	Romania	SMEs	511 111	4.4
Finland	large	650	5.0	Romania	large	1651	6.4
France	SMEs	2 929 720	33.9	Slovakia	SMEs	508 136	732.6
France	large	4753	9.5	Slovakia	large	594	17.9
Germany	SMEs	2 568 490	27.2	Slovenia	SMEs	147 555	33.5
Germany	large	11 810	24.3	Slovenia	large	242	−0.8
Greece	SMEs	710 419	−13.6	Spain	SMEs	2 660 980	5.4
Greece	large	526	9.6	Spain	large	3653	21.9
Hungary	SMEs	638 425	16.5	Sweden	SMEs	642 331	8.7
Hungary	large	918	16.2	Sweden	large	1416	42.3
Ireland	SMEs	262 702	10.8	Switzerland	SMEs	140 520	3.0
Ireland	large	592	41.0	Switzerland	large	1203	21.0
Italy	SMEs	3 589 950	−6.9	Turkey	SMEs	2 950 710	22.9
Italy	large	3641	13.1	Turkey	large	4543	65.7
Latvia	SMEs	110 400	42.6	UK	SMEs	2 214 860	33.8
Latvia	large	212	14.0	UK	large	6958	13.4

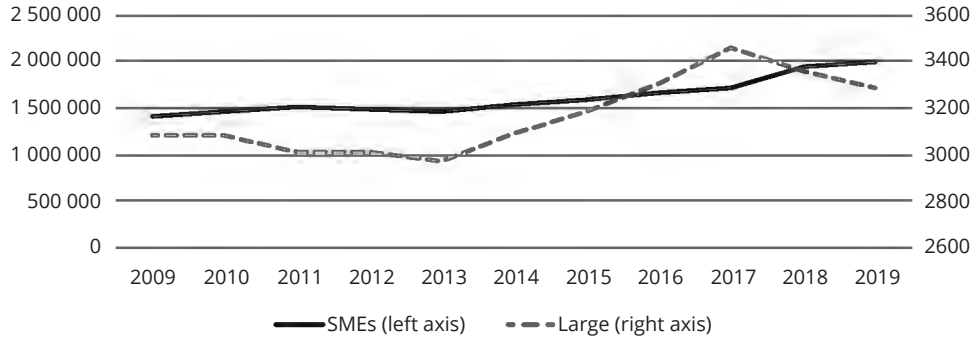
Source: OECD [2022].

The countries with the most SMEs are Italy (3.59 million), Turkey (2.95 million), France (2.93 million), Spain (2.66 million), and Germany (2.57 million). The number of large enterprises is the highest in Germany (11 810), the United Kingdom (6958), France (4753), Turkey (4543), and Spain (3653). One obvious conclusion is that some large economies (e.g., Italy) place a higher priority on SMEs than other large economies (e.g., Germany). Poland is ranked 7th according to both the number of SMEs (2 million) and large enterprises (3284). Compared to 2009, the number of enterprises has increased in almost every country. The four exceptions are SMEs in Greece (−13.6%) and Italy (−6.9%), as well as large enterprises in Bulgaria (−1.8%) and Slovenia (−0.8%). Notably, Slovakia had a single massive jump in the number of SMEs from 2009 to 2010.

The number of SMEs in Poland has been steadily growing over the last few years. In 2019, it stood at almost 2 million. On the other hand, the number of large enterprises peaked in 2017 at 3454 and has since slightly decreased. In total, compared to 2009, the number of SMEs grew by 40.6% and the number of large enterprises grew by

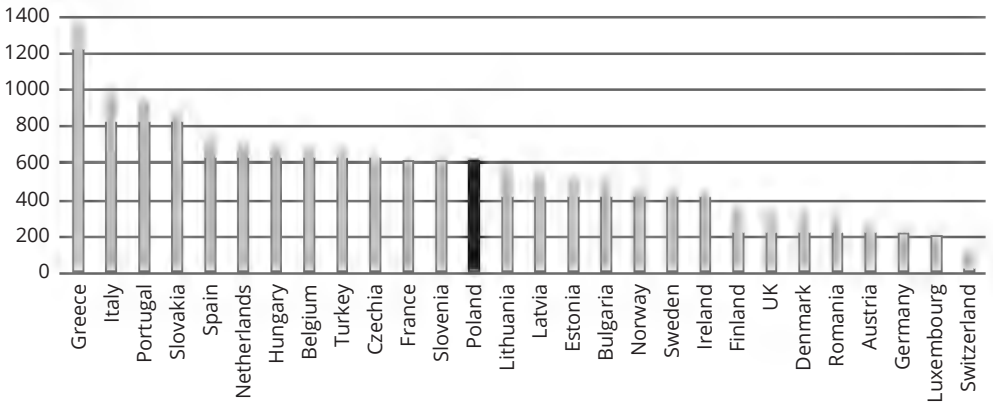
a modest 6.7%. Considering the above, one could infer that Poland's economy relies heavily on SMEs, but the actual SME/large ratio places it in the middle of the pack for European countries (as shown in Figure 4.4).

Figure 4.3. Number of enterprises in Poland in 2009–2019 (business economy, except financial and insurance activities)



Source: OECD [2022].

Figure 4.4. Number of SMEs per large enterprise in 2019 (business economy, except financial and insurance activities)



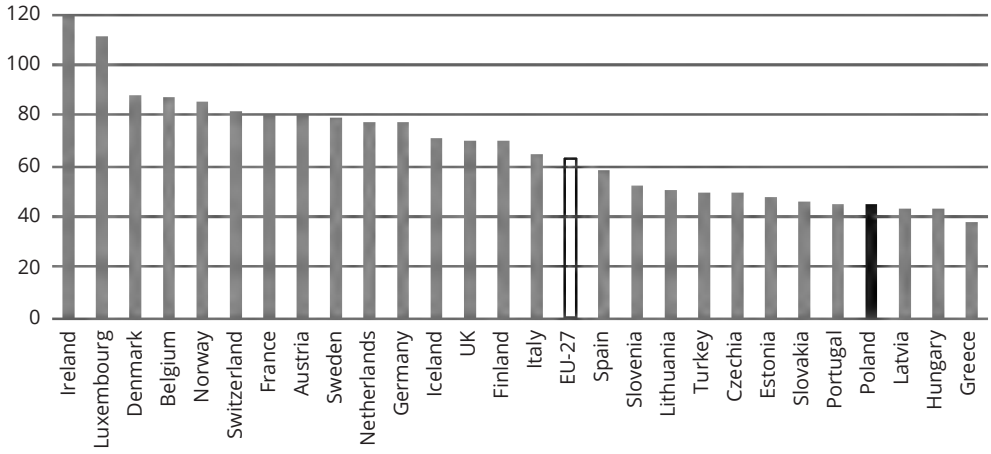
Source: OECD [2022].

The degree of reliance on SMEs varies between different European economies. The number of SMEs per large enterprise is the highest in Greece (1351), Italy (986), Portugal (938), Slovakia (855), and Spain (728). Poland (609) is ranked 13th out of 28 countries. Switzerland (117), Luxembourg (202), Germany (217), Austria (272), and Romania (310) have the lowest ratios.

4.3. Productivity

Labor productivity is one of the key areas of economic theory [Radło, Tomeczek, 2022]. With increased productivity in advanced economies come increased output (higher GDP) and better life quality (fewer hours worked). As shown by Figure 4.5 and Figure 4.6, Poland still lags behind the leaders on both fronts.

Figure 4.5. GDP per hour worked in 2020 (USD, current prices, PPP)

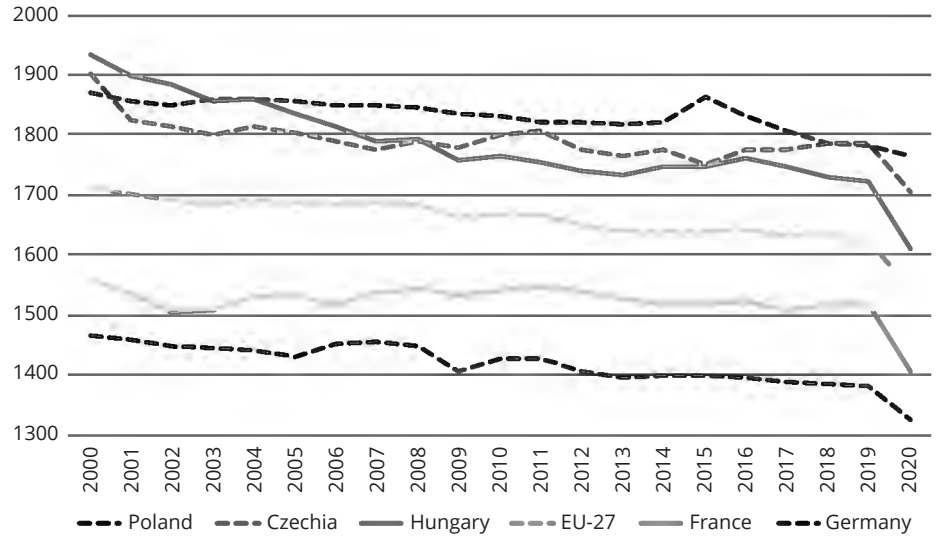


Source: OECD [2022].

Countries with the highest productivity are Ireland (USD 119), Luxembourg (USD 111), Denmark (USD 88), Belgium (USD 87), and Norway (USD 86). Poland (USD 45) is ranked fourth to last, ahead of Latvia (USD 43), Hungary (USD 43), and Greece (USD 37).

Although, in general, people have been working fewer and fewer hours, the divide between Eastern and Western Europe can still be strikingly seen in the above graph. In 2000, people in Poland (1869) worked fewer hours than in Hungary (1932) and Czechia (1900). In 2020 the situation was reversed, with Poland (1766) overtaking both Czechia (1704) and Hungary (1609). Average hours worked in all three of the Central and Eastern European countries remained much higher than in France (1407) and Germany (1324). Significantly, the pandemic-related drop in working hours was the smallest in Poland. In fact, in 2020 Poland (1766) was the country with the highest number of hours worked in all of Europe, far above the EU-27 average (1542) and ahead of Ireland (1743) and Turkey (1732). The long hours worked by the Poles, even before the pandemic, have further pushed down the relatively weak labor productivity in this country.

Figure 4.6. Average hours worked per person employed in 2000–2020



Source: OECD [2022].

Table 4.2 lists the most productive economic sectors in Poland. Historically, Poland has had a relatively strong comparative advantage in digital technologies but underperformed according to the number of relevant patents [Weresa, 2019]. OECD defines labor productivity as value added per person employed. Economic activity is categorized according to the ISIC (International Standard Industrial Classification of All Economic Activities). The gap is the difference between the productivity of large enterprises and that of SMEs.

Table 4.2. Labor productivity in Poland by activity and size class in 2019 (national currency, millions)

Activity	Total	SMEs	Large	Gap
Electricity, gas, steam and air conditioning supply (35)	0.422	0.286	0.448	0.162
Real estate activities (68)	0.217	0.221	0.167	−0.054
Information and communication (58–63)	0.174	0.103	0.289	0.186
Manufacturing (10–33)	0.127	0.089	0.169	0.080
Construction (41–43)	0.098	0.090	0.171	0.081
Professional, scientific and technical activities (69–75)	0.091	0.081	0.164	0.083
Transportation and storage (49–53)	0.090	0.068	0.126	0.058

Source: OECD [2022].

The most productive industries are electricity and gas (PLN 422 thousand), real estate (PLN 217 thousand), and information and communication (PLN 174 thousand). Large enterprises experience much higher productivity in most cases. This large gap is especially noticeable in the information and communication industry (large: PLN 289 thousand; SMEs: PLN 103 thousand). Out of the economic activities presented in the table, real estate is the only one where SMEs are more productive than large firms.

4.4. Enterprise financing

Enterprises can fund their activities through debt or equity financing. The pecking order hypothesis states that firms prefer internal financing over external financing. Watson and Wilson [2002] confirm the existence of the pecking order for SMEs in the United Kingdom. They show that "(…) the use of retained earnings will be preferred over debt and that debt will be preferred over new share issues to outsiders" [Watson, Wilson, 2002, p. 576]. However, Frank and Goyal [2003] find no evidence of the pecking order among large enterprises in the United States. Gombola and Marciukaityte [2007] show that managers of high-growth enterprises who are overoptimistic about the future tend to choose debt financing over equity financing, which leads to worse stock performance in those cases. Firms seeking equity financing should prioritize the quality of their corporate governance [Mande, Park, Son, 2012]. Cavallo, Ghezzi, Dell'Era, and Pellizzoni [2019] posit that venture capital funds in Italy have a positive impact on the growth of digital scale-ups (linear relationship) and start-ups (inverted U-relationship with a peak at USD 300 thousand).

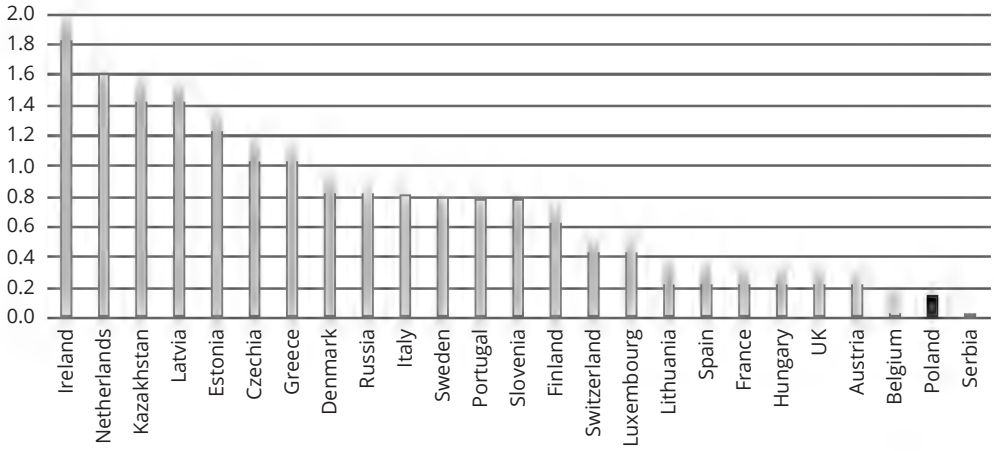
Figure 4.7 shows the interest rate spread, which is defined by the OECD as the difference between the interest rate of new long-term bank loans to SMEs and the interest rates of new long-term bank loans to large firms (the higher this value the more SMEs are disadvantaged). With regard to non-bank financing in Poland, Figure 4.8 presents the value of total venture and growth investments since 2007 (which include seed, start-up, and later-stage venture investments). The historical data on non-performing loans in Poland is visualized in Figure 4.9.

The interest rate spread is the highest in Georgia (9 p.p.) and Ukraine (5.2 p.p.), but they have been removed from the graph for better readability. Other than that, countries that lead in this metric are Ireland (1.9 p.p.), the Netherlands (1.6 p.p.), Kazakhstan (1.5 p.p.), Latvia (1.5 p.p.), and Estonia (1.3 p.p.). The situation in Poland (0.1 p.p.) is very favorable to SMEs.

From 2007 (EUR 148 million) to 2020 (EUR 236 million), growth and venture capital in Poland increased by 60%. The year-over-year growth fluctuated wildly. In

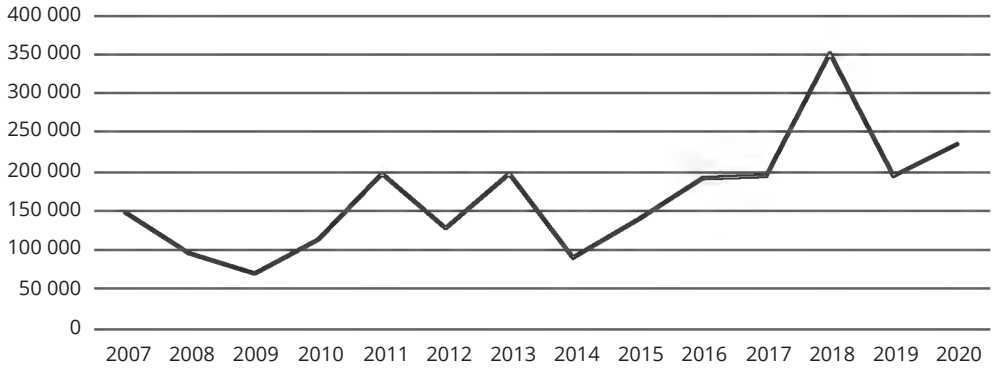
2014, such investments were valued at EUR 89 million, compared to EUR 198 million in 2013 (a drop of EUR 109 million). Venture capital in Poland peaked in 2018 at EUR 350 million. The long-term prospects of growth and venture capital in Poland show promise, but the actual values remain relatively low and the future is uncertain amid the pandemic and war.

Figure 4.7. Interest rate spread in 2020 (p.p.)



Source: OECD [2022].

Figure 4.8. Growth capital and venture capital in Poland in 2007–2020 (EUR thousands)

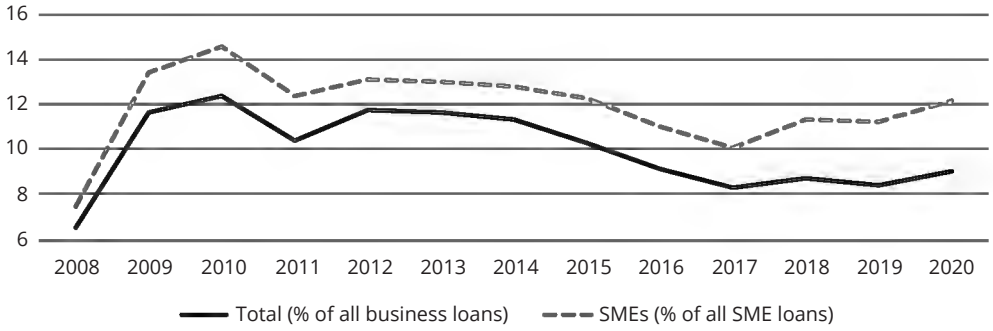


Source: OECD [2022].

The percentage of non-performing loans has consistently been higher for SMEs. The time series is characterized by a high uptick in 2009 related to the global financial crisis, a slow downward trend between 2012 and 2017, and a pronounced uptick

in 2020. In recent years, the spread between SMEs and total companies has grown larger. The disruption of global value chains caused by the pandemic is sure to worsen the financial situation of many SMEs.

Figure 4.9. Non-performing loans in Poland in 2008–2020 (%)



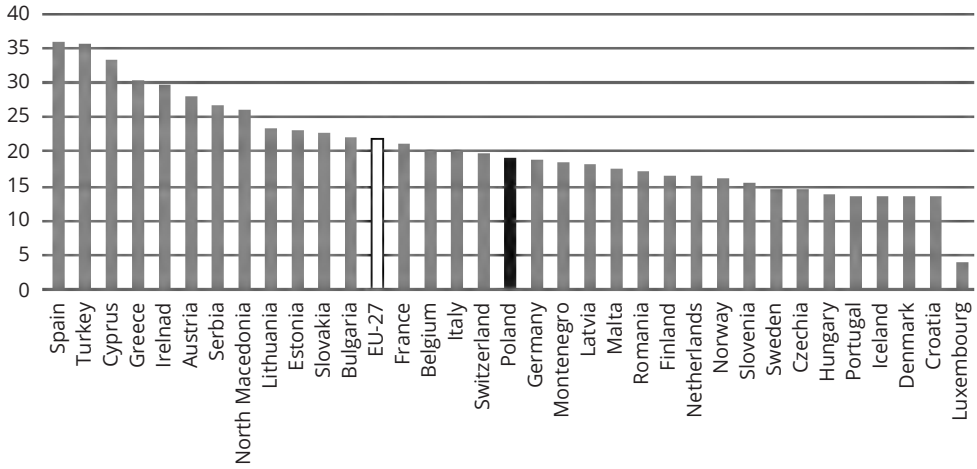
Source: OECD [2022].

4.5. Skill mismatch

Figure 4.10 shows the vertical skill mismatch in selected European countries, which is defined as "(…) how many high-skilled persons (meaning persons who have completed tertiary education level based on the ISCED classification) are employed in occupations (based on the ISCO classification) that do not require tertiary education" [Eurostat, 2022]. The other type of skill mismatch – horizontal – is shown in Figure 4.11. This type of labor market inefficiency is understood as "(…) how many employed persons are working in occupations (based on the ISCO classification) that do not correspond to the field of education they have attended (based on the ISCED-F classification)" [Eurostat, 2022]. Eurostat specifies occupations that do not require tertiary education as ISCO major groups 4–9 (International Standard Classification of Occupations). Tertiary education is defined as ISCED levels 5–8 (International Standard Classification of Education).

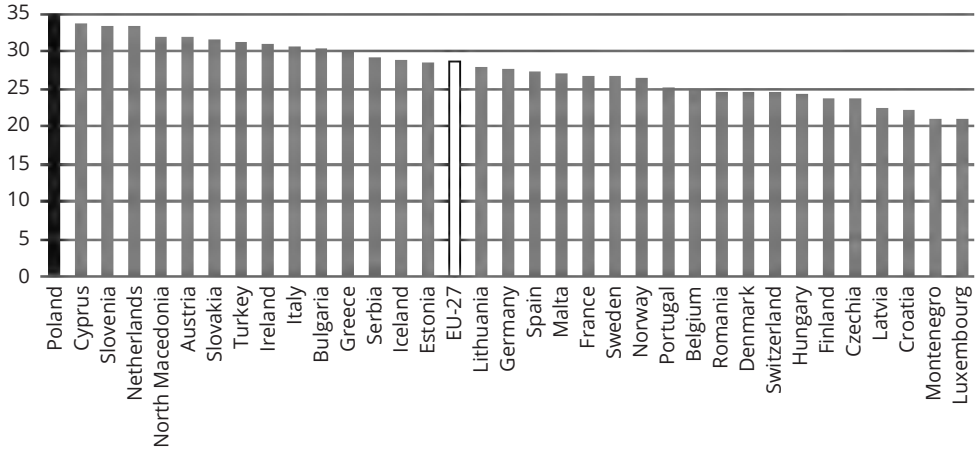
The overqualification rate is the highest in Spain (35.8%), Turkey (35.3%), Cyprus (33.2%), Greece (30.2%), and Ireland (29.5%). Poland is ranked 17th (19%), slightly ahead of Germany (18.8%), and below the EU-27 average (21.5%). Most of the large economies (France, Italy, Germany) have similar values, close to the average. Czechia (14.3%) and Hungary (13.9%) have significantly better scores than Poland, while Slovakia (22.5%) performs worse. Luxembourg (3.9%) has, by far, the lowest vertical skill mismatch rate.

Figure 4.10. Vertical skill mismatch in 2020 (% of people aged 20–64 with tertiary education and working in ISCO 4–9)



Source: Eurostat [2022].

Figure 4.11. Horizontal skill mismatch in 2020 (% of people aged 25–34 with tertiary education working in occupations that do not correspond to their field of education)



Source: Eurostat [2022].

The proportion of persons with tertiary education working in a different field is the highest in Poland (34.7%), Cyprus (33.5%), Slovenia (33.2%), the Netherlands (33.1%), and North Macedonia (31.8%). Germany (27.4), Spain (27.1%), and France (26.6%) are slightly below the EU-27 average (28.3%), while Italy (30.6%) is above

it. The horizontal mismatch rate in Hungary (24.2%) and Czechia (23.4%) is, once again, much lower than in Poland. Luxembourg (20.8%) has the best score, although this time it is much closer to other countries.

4.6. Conclusions

Poland is among the European leaders in enterprise birth rate, enterprise death rate, and share of start-ups among active employer enterprises. The number of SMEs is the highest in Italy, Turkey, and France. In the case of large enterprises, the leaders are Germany, the United Kingdom, and France. The ratio of SMEs to large enterprises is the highest in Greece, Italy, and Portugal. The same ratio is the lowest in Switzerland, Luxembourg, and Germany. A high ratio indicates a possible oversaturation of the market with SMEs.

Ireland, Luxembourg, and Denmark are leaders in labor productivity. Poland is one of the European countries where productivity is the lowest. Additionally, Poland is ranked 1st in hours worked per person. The labor force in Poland is overworked, and this leads to subpar labor productivity. By far, the most productive industry in Poland is electricity and gas. Most industries show much higher labor productivity in large enterprises compared to SMEs (the only exception is real estate).

The interest rates faced by SMEs and large enterprises in Poland are almost identical, which compares favorably with the situation in other European countries. The long-term growth of venture capital in Poland is promising, but the actual values remain relatively low. The percentage of non-performing loans has consistently been higher for Polish SMEs, with an uptick in 2020. The vertical skill mismatch in Poland is below the EU-27 average. Unfortunately, Poland is the leader when it comes to horizontal skill mismatch. This means that the percentage of people with tertiary education and not working in a corresponding field is the highest in Poland. The future of entrepreneurship in Poland is heavily dependent on how well the European Union will handle the economic turbulence caused by the threat of recession, pandemic, and war.

Bibliography

Adler, P., Florida, R., King, K., Mellander, C. (2019). The City and High-Tech Startups: The Spatial Organization of Schumpeterian Entrepreneurship, *Cities*, 87, pp. 121–130. DOI: 10.1016/j.cities.2018.12.013.

Balocco, R., Cavallo, A., Ghezzi, A., Berbegal-Mirabent, J. (2019). Lean Business Models Change Process in Digital Entrepreneurship, *Business Process Management Journal*, 25(7), pp. 1520–1542. DOI: 10.1108/BPMJ-07-2018-0194.

Bortolini, R.F., Nogueira Cortimiglia, M., Danilevicz, A., Ghezzi, A. (2021). Lean Startup: A Comprehensive Historical Review, *Management Decision*, 59(8), pp. 1765–1783. DOI: 10.1108/MD-07-2017-0663.

Cavallo, A., Ghezzi, A., Dell'Era, C., Pellizzoni, E. (2019). Fostering Digital Entrepreneurship from Startup to Scaleup: The Role of Venture Capital Funds and Angel Groups, *Technological Forecasting and Social Change*, 145, pp. 24–35. DOI: 10.1016/j.techfore.2019.04.022.

Eurostat (2022). *Experimental Statistics*, https://ec.europa.eu/eurostat/web/experimental-statistics/skills (accessed: 24.06.2022).

Frank, M.Z., Goyal, V.K. (2003). Testing the Pecking Order Theory of Capital Structure, *Journal of Financial Economics*, 67(2), pp. 217–248. DOI: 10.1016/S0304-405X(02)00252-0.

Ghezzi, A. (2019). Digital Startups and the Adoption and Implementation of Lean Startup Approaches: Effectuation, Bricolage and Opportunity Creation in Practice, *Technological Forecasting and Social Change*, 146, pp. 945–960. DOI: 10.1016/j.techfore.2018.09.017.

Ghezzi, A., Cavallo, A. (2020). Agile Business Model Innovation in Digital Entrepreneurship: Lean Startup Approaches, *Journal of Business Research*, 110. DOI: 10.1016/j.jbusres.2018.06.013.

Gombola, M., Marciukaityte, D. (2007). Managerial Overoptimism and the Choice between Debt and Equity Financing, *Journal of Behavioral Finance*, 8(4), pp. 225–235. DOI: 10.1080/15427560701699510.

Harms, R., Schwery, M. (2020). Lean Startup: Operationalizing Lean Startup Capability and Testing Its Performance Implications, *Journal of Small Business Management*, 58(1), pp. 200–223. DOI: 10.1080/00472778.2019.1659677.

Kowalski, A.M., Marcinkowski, A. (2014). Clusters versus Cluster Initiatives, with Focus on the ICT Sector in Poland, *European Planning Studies*, 22(1), pp. 20–45. DOI: 10.1080/09654313.2012.731040.

Mande, V., Park, Y.K., Son, M. (2012). Equity or Debt Financing: Does Good Corporate Governance Matter?, *Corporate Governance: An International Review*, 20(2), pp. 195–211. DOI: 10.1111/j.1467-8683.2011.00897.x.

OECD (2022). *OECD Statistics*, https://stats.oecd.org/ (accessed: 24.06.2022).

Radło, M.J., Tomeczek, A.F. (2022). Factors Influencing Labor Productivity in Modern Economies: A Review and Qualitative Text Analysis, *WSEAS Transactions on Environment and Development*, 18, pp. 291–314. DOI: 10.37394/232015.2022.18.30.

Ries, E. (2011). *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*. New York: Crown Business.

Rok, B., Kulik, M. (2021). Circular Start-up Development: The Case of Positive Impact Entrepreneurship in Poland, *Corporate Governance: The International Journal of Business in Society*, 21(2), pp. 339–358. DOI: 10.1108/CG-01-2020-0043.

Schumpeter, J.A. (1994). *Capitalism, Socialism and Democracy*. London: Routledge. DOI: 10.4324/9780203202050.

Watson, R., Wilson, N. (2002). Small and Medium Size Enterprise Financing: A Note on Some of the Empirical Implications of a Pecking Order, *Journal of Business Finance*, 29(3–4), pp. 557–578. DOI: 10.1111/1468-5957.00443.

Weresa, M.A. (2019). Technological Competitiveness of the EU Member States in the Era of the Fourth Industrial Revolution, *Economics and Business Review*, 5(3), pp. 50–71. DOI: 10.18559/ebr.2019.3.4.

Chapter 5

Foreign Direct Investment in Poland and Polish Investment Abroad

Tomasz Marcin Napiórkowski

5.1. Introduction

With the increasing role of multinational corporations [Wilkins, 1998; Kleinert, 2001], Foreign Direct Investment (FDI) has become a key component of the globalization process [Ietto-Gillies, 2011]. International business links in the form of global supply chains [as discussed, e.g., by Cohen, Malik, 1997] has allowed enterprises to maximize their profits [Shen, 2006; Fernandes, Pinho, Gouveia, 2015]. International expansion has enabled firms to seek new markets [Luo, Park, 2001], locate production in countries offering low production costs [Haller, 2016] and overall efficiency improvement, e.g., through tax optimization [Otusanya, 2011]. The process of acquiring strategic assets is also of significance [Ramasamy, Yeung, 2022]. At the country level, FDI plays the role of multiplier of production inputs [Lipsey, 2002; Napiórkowski, 2017; Sunde, 2017], as hosting them involves a higher accumulation of physical capital [Lo, Hong, Li, 2016], increased workforce supply [Javorcik, 2015] and technology [Svedin, Stage, 2016] and know-how transfer [Wang, Wu, 2016]. This is in line with a whole range of both exogenous [e.g., Solow, 1956; Ramsey, 1928; Koopmans, 1963; Cass, 1965; Diamond, 1965] and endogenous [Romer, 1986, 1990; Lucas, 1988; Rebelo, 1990; Aghion-Howitt, 1992] theories of economic growth. The importance of the links and investments described above for the daily functioning of consumers, companies and entire economies has been demonstrated by the recent COVID-19 pandemic [UNCTAD, 2020, 2021; Ciobanu, Șova, Popa, 2020] and the ongoing armed conflict in Ukraine [Ruta, 2022].

The goal of this chapter is to work out observations on the activity of foreign capital in the form of FDI from and in Poland. Poland is a country where foreign capital played a significant role in economic development in the early 1990s and still remains one of the key economic factors [KPMG, 2010, 2020]. For this reason, the functioning of this economy cannot be discussed without analyzing FDI. To achieve the presented

goal, secondary data current at the time of writing from the databases of UNCTAD [UNCTAD, 2022], the National Bank of Poland [NBP, 2022] and the Local Data Bank of Statistics Poland [Statistics Poland, 2022] will be used.

The remainder of this chapter is planned as follows. After presenting the position of Poland as a country receiving and providing FDI vis-à-vis the world, key sources and destinations of Polish FDI will be discussed from a geographical and sectoral perspective. The last part of the chapter is devoted to the description of the activity of enterprises with foreign capital in Poland from the voivodeship perspective.

5.2. Position of Poland in the world as an FDI host and source country

FDI inflows[1] to Poland (measured as % of FDI inflows in the world, Figure 5.1) in 2021 (1.57%) were close to the 2004 maximum (1.74%). Combining this observation with the fact that over the last five years the value of FDI inflows to Poland has been growing almost continuously, one can conclude that the relative attractiveness of Poland for foreign investors is also growing. This conclusion is confirmed by the observation that the 2021 figure is much higher than the long-term (1990–2021) average (0.85%).

Figure 5.1. Inward FDI flows (IFDI F) and outward FDI flows (OFDI F) in 1990–2021 (% of the world)

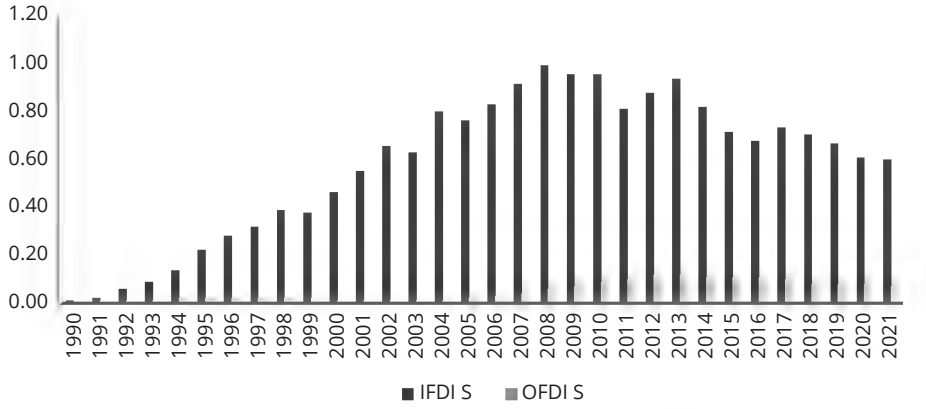
Source: compiled by author based on UNCTAD [2022].

[1] "Foreign Direct Investment (FDI) flows record the value of cross-border transactions related to direct investment during a given period of time, usually a quarter or a year. Financial flows consist of equity transactions, reinvestment of earnings, and intercompany debt transactions" [OECD, 2022].

However, a different picture emerges from the data describing the FDI stock (position)[2] in Poland (Figure 5.2), where Poland is seen to be virtually constantly declining from 0.98% in 2008 (long-term maximum) to 0.59% in 2021.

The position of Poland as an FDI source is negligible vis-à-vis the world (Figure 5.1 and Figure 5.2). In 2021, only 0.01% of outward FDI flows in the world came from Poland, much below the long-term average (0.10%). At the same time, FDI stock from Poland represented only 0.07% of FDI stock in the world, with the long-term average being 0.04%.

Figure 5.2. Poland's inward FDI stock (IFDI S) and outward FDI stock (OFDI S) in 1990–2021 (% of the world)



Source: compiled by author based on UNCTAD [2022].

5.3. Geographical and sectoral sources of FDI in Poland

Both in 2020 and throughout the period 2010–2020, investors from Europe were the key source of FDI in Poland (Table 5.1), accounting for 95.5% of Poland's FDI inward position in 2020. Despite the visible decrease in the share of European companies since 2018 (96.3%), the 2020 figure is above the average calculated for the period 2010–2020 (94.8%). The runner up is Asia (2.6%), which (following an increase in

[2] "Foreign Direct Investment (FDI) stocks measure the total level of direct investment at a given point in time, usually the end of a quarter or of a year. The outward FDI stock is the value of the resident investors' equity in and net loans to enterprises in foreign economies. The inward FDI stock [not to be confused with inflows] is the value of foreign investors' equity in and net loans to enterprises resident in the reporting economy" [OECD, 2021].

activity since 2017) overtook America for the first time (1.8%), with the latter's share virtually constantly decreasing (from 6% in 2010).

The largest investors from Europe in 2020 were the Netherlands (22.05% of Poland's total FDI inward position), Germany (17.32%), Luxembourg (13.11%), and France (8.43%). The main FDI source from America was the United States of America (1.70%).

In terms of foreign investors' income from capital invested in Poland in the form of direct investments in 2020, the leader from the Old Continent was the Netherlands (26.51% of the total income earned by foreign investors in Poland). Germany came second (19.31%), followed by Luxembourg (14.08%) and France (7.16%). Among investors from America, the USA had the largest share of the income concerned (2.14%). As can be seen, the share of income reflects the share of Poland's FDI inward position.

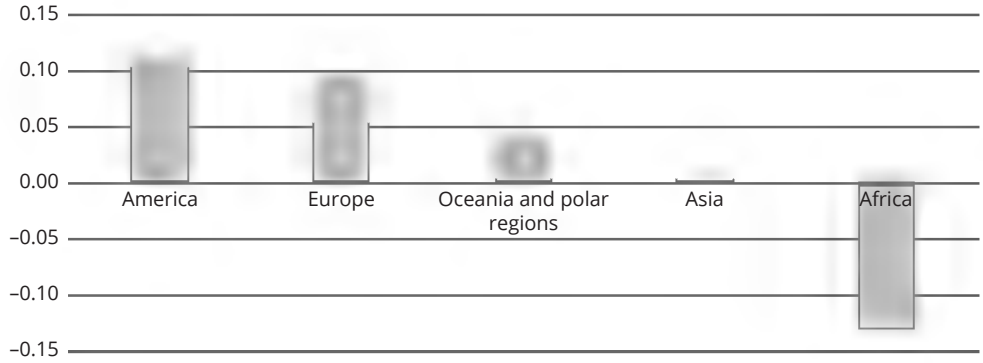
The most efficient investors in terms of income per unit of FDI stock are those from America (0.11) and Europe (0.09, Figure 5.3).

Table 5.1. FDI inward position of Poland by region in 2010–2020 (%)

Region	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Europe	91.8	93.3	93.5	94.1	94.7	95.6	95.7	96.0	96.3	95.8	95.5
Africa	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
America	6.0	5.0	4.7	4.4	3.8	2.8	3.0	2.7	2.2	2.2	1.8
Asia	1.9	1.7	1.5	1.4	1.4	1.5	1.4	1.3	1.5	2.0	2.6
Oceania and polar regions	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

Source: compiled by author based on NBP [2022].

Figure 5.3. Efficiency of FDI in Poland (income/position) by region in 2020



Source: compiled by author based on NBP [2022].

In terms of the types of economic activity of direct investment enterprises in Poland in 2010–2020, services are the most important (57.45%). Among them, wholesale and retail trade, repair of motor vehicles and motorcycles (15.08%) and financial and insurance activities (12.42%) prevailed.

Services accounted for 58.87% of all FDI income of foreign investors in Poland in 2020. In services, wholesale and retail trade, repair of motor vehicles and motorcycles (21.10%), financial and insurance activities (11.27%), and information and communication (8.39%) were of key significance. With processing 34.12% of the described income is associated with manufacturing. As in geographical analysis, the sector-based description reflects the size of investments in the generated income.

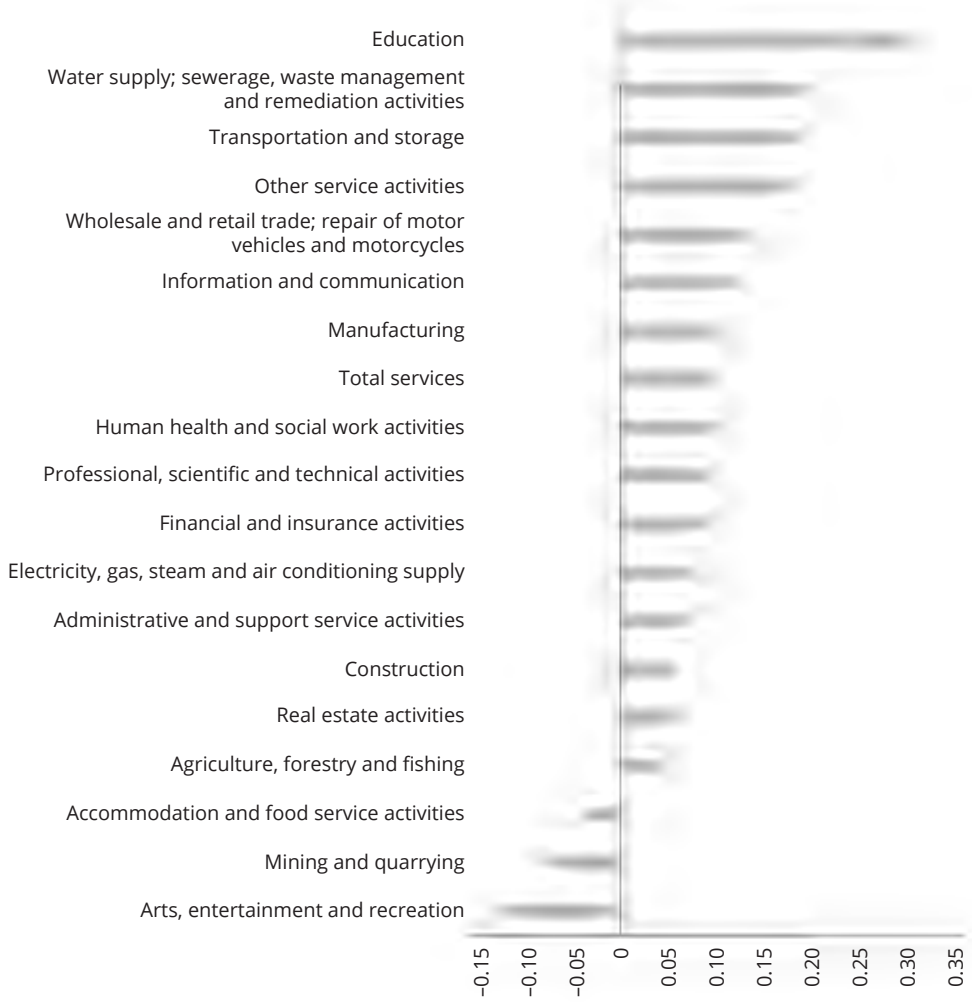
The highest efficiency was achieved in 2020 by investors in the areas of education (0.29), water supply, sewerage, waste management and remediation activities (0.19), and transportation and storage (0.18, Figure 5.4).

Table 5.2. FDI inward position of Poland by type of economic activity of direct investment enterprises in 2010 and 2020 (%)

Type of economic activity of direct investment enterprises	2010	2020
Agriculture, forestry and fishing	0.38	0.42
Mining and quarrying	0.20	0.21
Manufacturing	31.26	32.84
Electricity, gas, steam and air conditioning supply	3.24	2.68
Water supply; sewerage, waste management and remediation activities	0.31	0.24
Construction	4.59	5.32
Total services	59.70	57.45
Wholesale and retail trade; repair of motor vehicles and motorcycles	15.52	15.08
Transportation and storage	1.34	1.57
Accommodation and food service activities	0.53	1.09
Information and communication	4.75	6.72
Financial and insurance activities	23.48	12.42
Real estate activities	6.60	10.75
Professional, scientific and technical activities	6.05	7.27
Administrative and support service activities	1.21	1.80
Education	0.01	0.01
Human health and social work activities	0.12	0.51
Arts, entertainment and recreation	0.03	0.16
Other service activities	0.05	0.08

Source: compiled by author based on NBP [2022].

Figure 5.4. FDI efficiency in Poland (income/position) by type of economic activity of direct investment enterprises in 2020



Source: compiled by author based on NBP [2022].

5.4. Geographical and sectoral destinations of FDI from Poland

Despite the decline in Europe's relative attractiveness for Polish FDI in 2010–2020, it was the most common recipient of FDI from Poland in 2020 (83.7%, Table 5.3). As destination of Polish FDI, America gained the most (10.7% in 2020, 4.9% in 2010), followed by Asia (4.8% in 2020, 2.7% in 2010).

From country perspective, the key European recipient of Polish FDI stock in 2020 was Luxembourg (15.15% of the total Polish FDI outward position), followed by Cyprus (12.56%), Czechia (11.38%), Germany (7.27%), and the United Kingdom (4.94%). In America, these were Canada (5.77%), Chile (2.30%), and the USA (1.57%).

The largest share of the income received in 2020 by foreign investors from Poland came from Cyprus (21.83%), followed by Luxembourg (17.53%), Czechia (12.26%), Thailand (11.42%), and Slovakia (9.60%).

The highest income per FDI outward position was derived by Polish investors from investments in Africa (44.17), followed by America (26.62), while Europe ranked third (20.47, Figure 5.5).

Table 5.3. Polish foreign direct investment outward position by region in 2010–2020 (%)

Region	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Europe	91.9	92.9	93.3	93.5	92.0	89.1	82.5	83.6	88.7	90.8	83.7
Africa	0.4	0.4	0.4	0.7	0.7	0.8	1.0	1.1	0.9	0.8	0.8
America	4.9	4.5	4.0	2.4	3.6	6.7	12.7	11.8	5.6	6.0	10.7
Asia	2.7	2.2	2.2	3.2	3.6	3.4	3.8	3.6	4.9	2.4	4.8
Oceania and polar regions	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: compiled by author based on NBP [2022].

Figure 5.5. Efficiency of FDI from Poland (income/position) by region in 2020

Source: compiled by author based on NBP [2022].

Moving on to the analysis of the Polish foreign direct investment outward position in terms of investment area, the 2020 list was topped by services, whose share relative to 2010 increased by 17.8 p.p. to 67.5% (Table 5.4). At the same time, the

share of manufacturing dropped by 19 p.p. to 19.5%. Among services, financial and insurance activities (25.2%), professional, scientific and technical activities (25.2%), and administrative and support service activities (16.6%) attracted the most interest.

A large proportion of income earned by Polish foreign investors was associated with services (77.42%) and only 21.35% with manufacturing. Wholesale and retail trade, repair of motor vehicles and motorcycles (26.63%), and financial and insurance activities (23.82%) were of key significance in this respect in the services category.

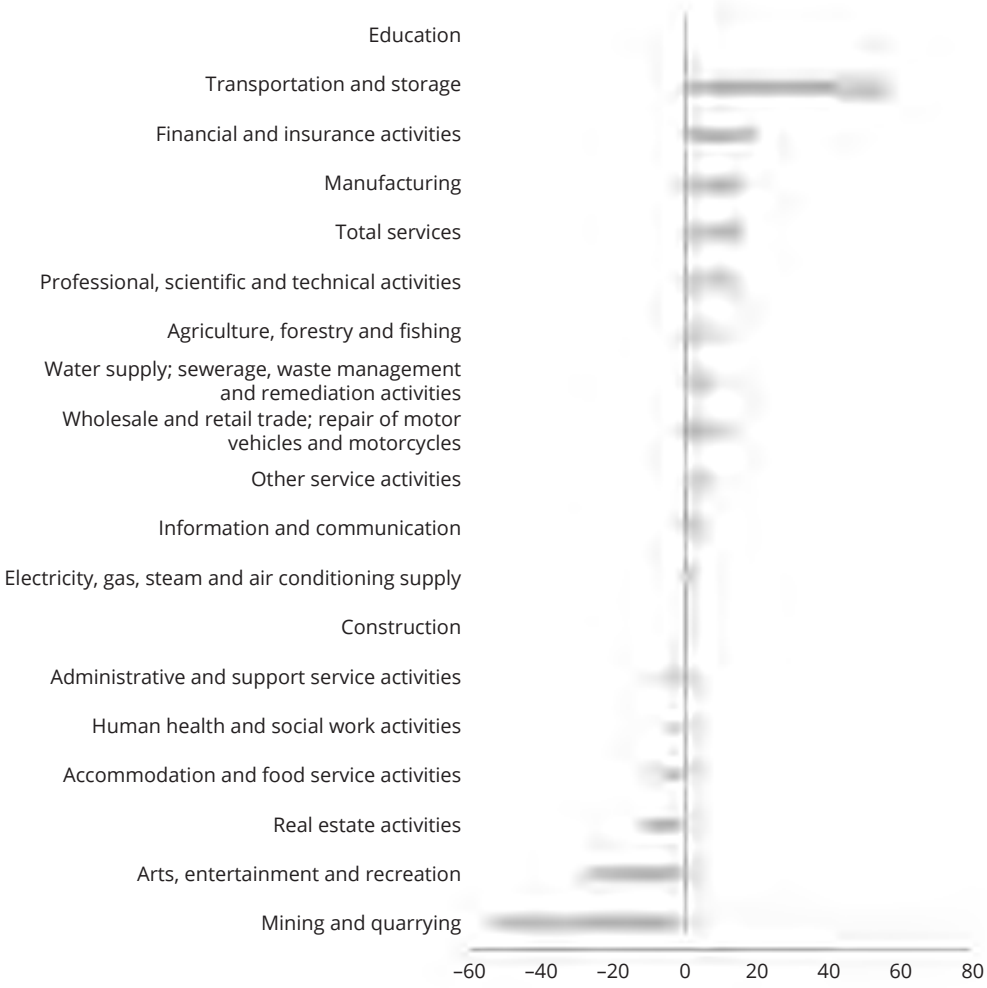
The highest efficiency in terms of income generation per FDI stock unit was attained by Polish investors in transportation and storage (56.27, Figure 5.6). Ranked in a rather distant second place are investments in financial and insurance activities (19.01) followed by manufacturing (16.47).

Table 5.4. Polish Foreign Direct Investment outward position by type of economic activity of direct investment enterprises in 2010 and 2020 (%)

Type of economic activity of direct investment enterprises	2010	2020
Agriculture, forestry and fishing	0.0	0.1
Mining and quarrying	1.4	10.7
Manufacturing	38.5	19.5
Electricity, gas, steam and air conditioning supply	2.3	0.3
Water supply; sewerage, waste management and remediation activities	−0.1	0.2
Construction	3.2	0.0
Total services	49.7	67.5
Wholesale and retail trade; repair of motor vehicles and motorcycles	12.1	13.3
Transportation and storage	1.1	2.7
Accommodation and food service activities	0.4	2.0
Information and communication	−3.7	3.7
Financial and insurance activities	19.2	25.2
Real estate activities	4.4	3.4
Professional, scientific and technical activities	14.7	16.6
Administrative and support service activities	1.4	−0.9
Education	0.0	0.0
Human health and social work activities	0.0	0.0
Arts, entertainment and recreation	0.0	0.1
Other service activities	0.1	1.5

Source: compiled by author based on NBP [2022].

Figure 5.6. Efficiency of FDI from Poland (income/position) by type of economic activity of direct investment enterprises in 2020



Notes: no data available for the "Education" category.

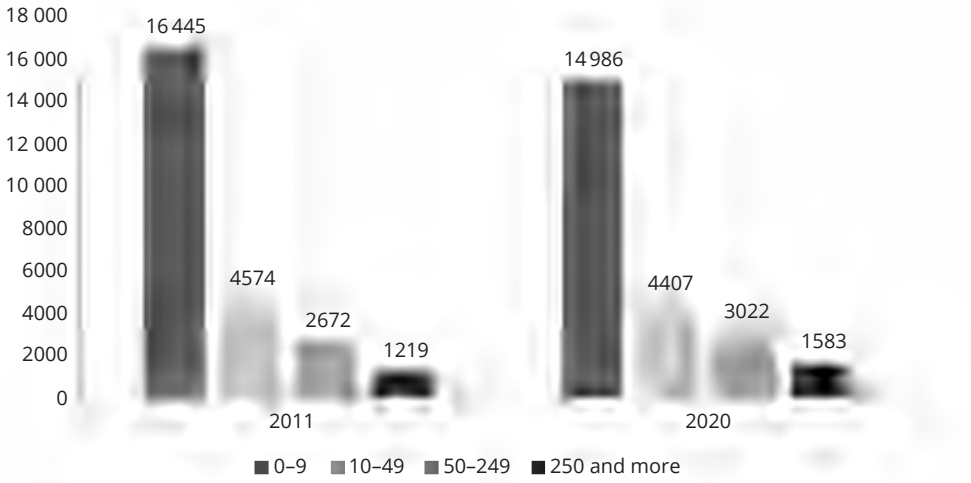
Source: compiled by author based on NBP [2022].

5.5. Enterprises with foreign capital in Poland – voivodeship perspective

Micro enterprises (i.e., businesses employing between 0 and 9 personnel) invariably represent a clear majority (62.45%) of enterprises with foreign capital (Figure 5.7). Enterprises with more than 249 employees account for the smallest share (6.60%).

Interestingly, the number of companies with foreign capital increased in 2020 relative to 2011 only in the case of medium-sized enterprises (50–249 employees) and large companies.

Figure 5.7. Enterprises with foreign capital by number of employees in 2011 and 2020



Source: compiled by author based on Statistics Poland [2022].

Concentration of FDI in Mazowieckie voivodeship is invariably visible (Table 5.5). In 2020, as many as 41.15% of enterprises with foreign capital in Poland were based in the voivodeship (37.92% w 2011). With regard to the value of foreign capital, Mazowieckie voivodeship accumulated 46.67% of it (48.53% in 2011). A slight decline in the attractiveness of the voivodeship in terms of FDI attraction is visible in foreign capital per inhabitant of working age (down from 32.12% in 2011 to 30.15% in 2020). Dolnośląskie voivodeship is in second place in terms of the indicators concerned, where (despite the relative decrease in the number of enterprises with foreign capital from 9.50% to 8.88%) an increase in the share of the value of foreign capital was recorded (from 9.09% to 10.37%) – also per capita of working age population (from 10.57% to 12.44%). Practically the least attractive areas from the perspective of foreign capital are Podlaskie, Warmińsko-Mazurskie and Lubelskie voivodships, referred to as Eastern Poland.

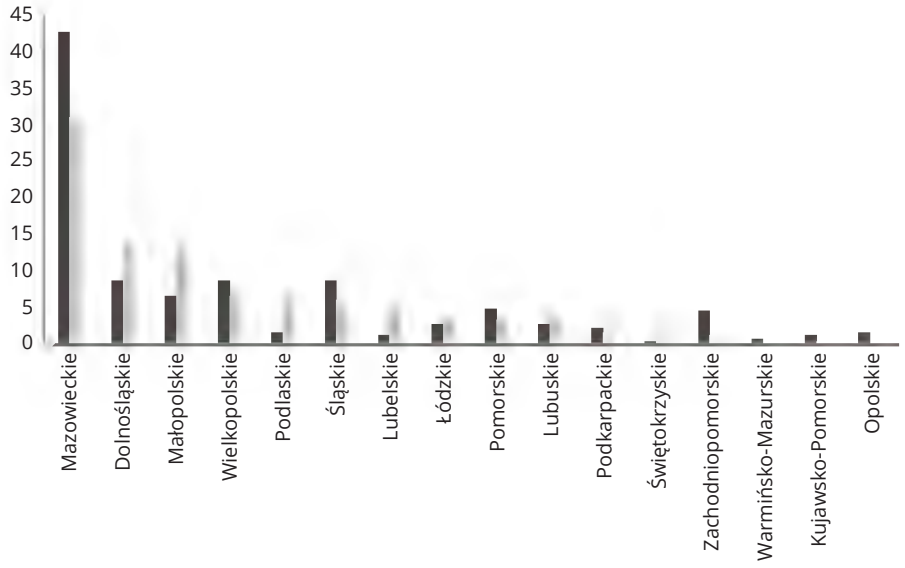
While it was in Mazowieckie voivodeship that the largest decrease (11.65 p.p.) in the share of newly established companies with foreign capital was recorded, in 2020 as much as 31.04% of newly established companies with foreign capital were set up in the voivodeship (Figure 5.8). The least such companies were established in Opolskie, Kujawsko-Pomorskie and Warmińsko-Mazurskie voivodeships.

Table 5.5. Location of foreign capital in Polish voivodeships in 2011 and 2020 (%)

Name	Number of enterprises		Foreign capital		Foreign capital per inhabitant of working age	
	2011	2020	2011	2020	2011	2020
Dolnośląskie	9.50	8.88	9.09	10.37	10.57	12.44
Kujawsko-Pomorskie	2.36	1.86	1.83	1.47	3.00	2.44
Lubelskie	1.42	2.10	0.75	0.89	1.21	1.46
Lubuskie	3.25	1.92	1.11	0.75	3.69	2.56
Łódzkie	4.15	3.70	2.88	2.66	3.97	3.84
Małopolskie	6.32	8.23	6.43	5.62	6.70	5.62
Mazowieckie	37.92	41.15	48.53	46.67	32.12	30.15
Opolskie	1.98	1.42	0.90	1.08	2.99	3.72
Podkarpackie	1.55	2.48	1.22	1.30	1.99	2.05
Podlaskie	0.64	0.96	0.27	0.38	0.78	1.09
Pomorskie	5.43	4.75	4.19	2.97	6.32	4.38
Śląskie	9.01	8.68	8.87	9.56	6.55	7.40
Świętokrzyskie	0.73	0.73	1.51	1.56	4.12	4.40
Warmińsko-Mazurskie	1.28	0.65	0.94	0.68	2.20	1.63
Wielkopolskie	8.92	8.35	8.98	11.23	8.91	11.04
Zachodniopomorskie	5.54	4.14	2.48	2.83	4.87	5.78

Source: compiled by author based on Statistics Poland [2022].

Figure 5.8. Share of newly established companies in voivodeships in 2020 (%)

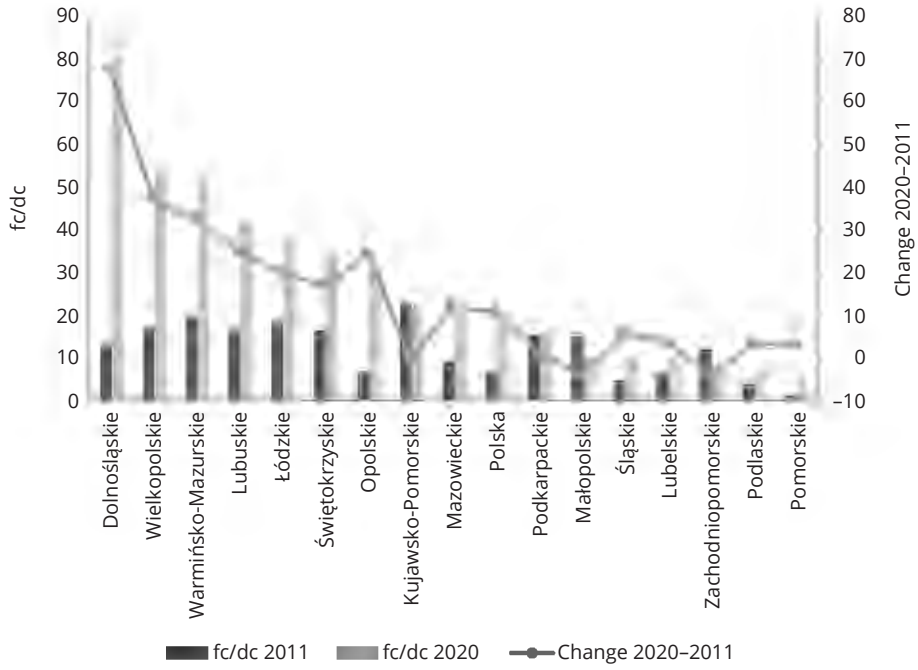


Notes: Poland = 100%.

Source: compiled by author based on Statistics Poland [2022].

In 2020, enterprises with foreign capital in Poland held PLN 17.48 million of foreign capital per PLN 1 million of domestic capital (Figure 5.9). The largest increase compared to 2011 (67.12) and the highest level in 2020 (80.08) was recorded in Dolnośląskie voivodeship. A decrease in the analyzed indicator was observed only in three voivodeships: Kujawsko-Pomorskie (0.55), Małopolskie (3.93) and Zachodniopomorskie (4.15).

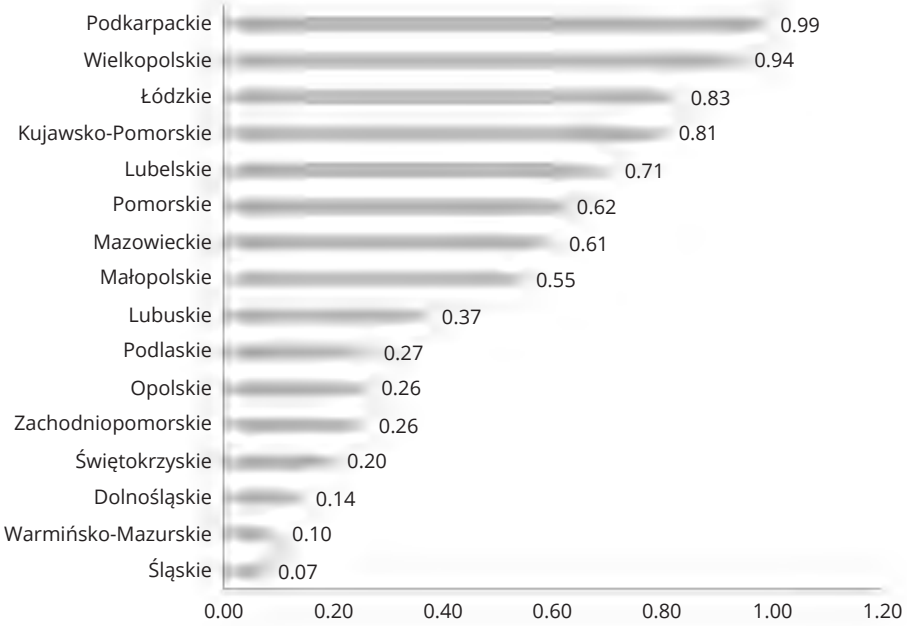
Figure 5.9. Foreign capital (fc) to domestic capital (dc) ratio in Poland and its voivodeships in 2020 and its change between 2011 and 2020



Source: compiled by author based on Statistics Poland [2022].

The highest net result in terms of the value of foreign capital invested in 2020 was achieved by enterprises with this capital in Podkarpackie (0.99) and Wielkopolskie (0.94, Figure 5.10) voivodeships. Companies the Łódzkie (0.83) and Kujawsko-Pomorskie (0.81) voivodeships also boasted high efficiency. Mazowieckie, the most attractive voivodeship for foreign investors, ranks in the middle of the pack with a score of 0.61, which is still above the average for all voivodeships (0.48).

Figure 5.10. Net income per unit of foreign capital by voivodeship in 2020



Source: compiled by author based on Statistics Poland [2022].

5.6. Conclusions

The goal of this chapter was to analyze the activity of foreign capital in the form of FDI from and in Poland. For this purpose, secondary data retrieved from Polish and foreign databases were used.

The analysis leads to the following observations:

1) Poland attracts more and more new investments, but increasingly few of these and earned funds remain in Poland, and FDI is becoming less popular with Polish companies as a form of foreign expansion.
   a) This means that the Polish economy can expect to continue deriving the benefits of hosting FDI [Soylu, 2019].
   b) From the policy point of view, measures are needed to create a more friendly environment [e.g., institutional, Dorożyński, Dobrowolska, Kuna-Marszałek, 2020] for foreign capital and to promote more risky foreign expansion (such as FDI compared to exports) by Polish companies.
2) FDI both from and to Poland is highly concentrated geographically (Europe) and sectorally (services, including wholesale and retail trade, repair of motor vehicles

and motorcycles, financial and insurance activities, professional, scientific and technical activities).

3) The largest FDI hosting region in Poland in Mazowieckie voivodeship, whereas Eastern Poland remains the least attractive for foreign investors.
   a) The visible FDI concentration results from the concentration of economic activities in Mazowieckie voivodeship [Napiórkowski, Radło, 2022]. Continuation of the observed trend will translate into a growing economic inequality in Poland.
   b) One of the objectives of economic policy should be to create additional incentives, e.g., tax incentives [Napiórkowski, 2016] and through special economic zones, government grants, industrial and technological parks [PAIH, 2022] for foreign investors deciding to invest in less popular regions.

The current armed conflict between Russia and Ukraine and the global recession expected in 2023 are unlikely to significantly alter the trends and observations made in this chapter. This results from the fact that, contrary to portfolio investments, which tend to be short-term, foreign direct investments are made looking toward a long-term goals.

Bibliography

Aghion, P., Howitt, P. (1992). A Model of Growth through Creative Destruction, *Econometrica*, 60(2), pp. 323–351.

Cass, D. (1965). Optimum Growth in an Aggregative Model of Capital Accumulation, *The Review of Economic Studies*, 32(3), pp. 233–240.

Ciobanu, R., Şova, R.A., Popa, A.F. (2020). The Impact of FDI over Economic Growth and How COVID-19 Crisis Can Impact the CEE Economies, *CECCAR Business Review*, 4, pp. 64–72.

Cohen, M.A., Malik, S. (1997). Global Supply Chains: Research and Applications, *Production and Operations Management*, 6(3), pp. 193–210.

Diamond, P.A. (1965). National Debt in Neoclassical Growth Model, *The American Economic Review*, 55(5), pp. 1126–1150.

Dorożyński, T., Dobrowolska, B., Kuna-Marszałek, A. (2022). Institutional Quality in Central and East European Countries and Its Impact on FDI Inflow, *Entrepreneurial Business and Economics Review*, 8(1), pp. 91–110.

Fernandes, R., Pinho, C., Gouveia, B. (2014). Supply Chain Networks Design and Transfer-Pricing, *The International Journal of Logistics Management*, 26(1), pp. 128–146.

Haller, A.P. (2016). Globalization, Multinational Companies and Emerging Markets, *Ecoforum*, 5(1), pp. 9–15.

Ietto-Gilles, G. (2011). The Role of Transnational Corporations in the Globalization Process. In: *The Handbook of Globalization* (pp. 173–184), J. Michie (Ed.). Cheltenham–Northampton: Edward Elgar Publishing.

Javorcik, B.S. (2015). Does FDI Bring Good Jobs to Host Countries?, *World Bank Research Observer*, 30(1), pp. 74–94.

Kleinert, J. (2001). The Role of Multinational Enterprises in Globalization: An Empirical Overview, *Kiel Working Paper*, 1069.

Koopmans, T.C. (1963). *On the Concept of Optimal Economic Growth*, https://cowles.yale.edu/sites/default/files/files/pub/d01/d0163.pdf (accessed: 07.09.2020).

KPMG (2010). *20 Years of American Investment in Poland. Report of the American Chamber of Commerce in Poland and KPMG*. Warsaw: KPMG.

KPMG (2020). *30 Years of American Investments in Poland. The American Chamber of Commerce in Poland and KPMG in Poland Report*. Warsaw: KPMG.

Lipsey, R.E. (2002). Home and Host Country Effects of FDI, *NBER Working Paper*, 9293.

Lo, D., Hong, F., Li, G. (2016). Assessing the Role of Inward Foreign Direct Investment in Chinese Economic Development, 1990–2007: Towards a Synthesis of Alternative Views, *Structural Changes and Economic Dynamics*, 37, pp. 107–120.

Lucas, R.E. (1988). On Mechanics of Economic Development, *Journal of Monetary Economics*, 22, pp. 3–42.

Luo, Y., Park, S.H. (2001). Strategic Alignment and Performance of Market-Seeking MNCS in China, *Strategic Management Journal*, 22, pp. 141–155.

Napiórkowski, T.M. (2016). Impact of FDI-Related Policies on the Inflow of FDI and the Presence of Multinational Corporations. In: *Poland Competitiveness Report 2016. The Role of Economic Policy and Institutions* (pp. 91–104), M.A. Weresa (Ed.). Warsaw: SGH Publishing House.

Napiórkowski, T.M. (2017). The Role of Foreign Direct Investment in Economic Growth. The Production Function Perspective, *Optimum*, 5(89), pp. 221–236.

Napiórkowski, T.M., Radło, M.J. (2022). *Czynniki wzrostu gospodarczego regionów i podregionów województwa mazowieckiego*. Warsaw: SGH Publishing House.

NBP (2021a). *Foreign Direct Investment in Poland*, https://www.nbp.pl/homen.aspx?f=/en/publikacje/ziben/ziben.html (accessed: 20.09.2022).

NBP (2021b). *Polish Direct Investment Abroad*, https://www.nbp.pl/homen.aspx?f=/en/publikacje/piben/piben.html (accessed: 20.09.2022).

OECD (2021). *FDI Stocks*, https://data.oecd.org/fdi/fdi-stocks.htm (accessed: 08.09.2021).

OECD (2022). *FDI Flows*, https://data.oecd.org/fdi/fdi-flows.htm (accessed: 28.09.2022).

Otusanya, O.J. (2011). The Role of Multinational Companies in Tax Evasion and Tax Avoidance: The Case of Nigeria, *Critical Perspectives on Accounting*, 22, pp. 316–332.

PAIH (2022). *Zachęty inwestycyjne*, https://www.paih.gov.pl/strefa_inwestora/zachety_inwestycyjne (accessed: 30.09.2022).

Ramasamy, B., Yeund, M. (2022). China's Outward Foreign Direct Investment (OFDI) to Developing Countries: The Case of Central and Eastern Europe (CEE), *Journal of the Asia Pacific Economy*, 27(1), pp. 124–146.

Ramsey, F.P. (1928). A Mathematical Theory of Saving, *The Economic Journal*, 38(152), pp. 543–599.

Rebelo, S. (1990). Long Run Policy Analysis and Long Run Growth, *National Bureau of Economic Research Working Paper*, 3325.

Romer, P.M. (1986). Increasing Returns and Long-Run Growth, *The Journal of Political Economy*, 94(5), pp. 1002–1037.

Romer, P.M. (1990). Endogenous Technological Change, *Journal of Political Economy*, 98(5), pp. 71–102.

Ruta, M. (Ed.). (2022). *The Impact of the War in Ukraine on Global Trade and Investment*, https://openknowledge.worldbank.org/handle/10986/37359 (accessed: 20.09.2022).

Shen, Z.J.M. (2006). A Profit-Maximizing Supply Chain Network Design Model with Demand Choice Flexibility, *Operations Research Letters*, 34, pp. 673–682.

Solow, R. (1956). A Contribution to the Theory of Economic Growth, *Quarterly Journal of Economics*, 70(1), pp. 65–94.

Soylu, Ö.B. (2019). Do Foreign Direct Investment and Savings Promote Economic Growth in Poland?, *Economic and Business Review*, 5(4), pp. 3–22.

Statistics Poland (2022). *Bank Danych Lokalnych*, https://bdl.stat.gov.pl/bdl/dane/podgrup/temat (accessed: 20.09.2022).

Sunde, T. (2017). Foreign Direct Investment, Exports and Economic Growth: ADRL and Causality Analysis for South Africa, *Research in International Business and Finance*, 41, pp. 434–444.

Svedin, D., Stage, J. (2016). Impacts of Foreign Direct Investment on Efficiency in Swedish Manufacturing, *SpringerPlus*, 5, pp. 1–17.

UNCTAD (2020). *World Investment Report 2020. International Production Beyond the Pandemic*. New York: United Nations Publications.

UNCTAD (2021). *World Investment Report 2021. Investing in Sustainable Recovery*. New York: United Nations Publications.

UNCTAD (2022). *Foreign Direct Investment and Economic Growth: Inward and Outward Flows and Stock, Annual*, https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=96740 (accessed: 20.09.2022).

Wang, C.C., Wu, A. (2016). Geographical FDI Knowledge Spillover and Innovation of Indigenous Firms in China, *International Business Review*, 25(4), pp. 895–906.

Wilkins, M. (1998). Multinational Corporations: An Historical Account. In: *Transnational Corporations and the Global Economy* (pp. 95–133), R. Kozul-Wright, R. Rothorn (Eds.). London: Palgrave Macmillan.

Chapter 6

Total Factor Productivity

Mariusz Próchniak

6.1. Introduction

The purpose of this chapter is to estimate the pace of technological progress in the countries of Central and Eastern Europe. There are different methods of estimating technical progress. One of them is the assessment of total factor productivity.

The analysis of total factor productivity will be carried out using the growth accounting methodology. Growth accounting is an empirical exercise aimed at determining to what extent economic growth results from changes in the measurable production factors and from changes in the level of technology, measured by the growth rate of total factor productivity (TFP).

The analysis at the whole economy level covers 11 countries of Central and Eastern Europe, i.e., the EU-11 group (Poland, Bulgaria, Croatia, Czechia, Estonia, Lithuania, Latvia, Romania, Slovakia, Slovenia, and Hungary) over the period 2012–2021. To assess the dynamics of changes in total factor productivity in the analyzed years, we also present the average TFP growth rates for the following two sub-periods: 2012–2015 and 2016–2019, providing a separate analysis for the years 2020 and 2021 owing to their specificities due to the coronavirus pandemic and the disturbance in Ukraine triggered by the imminent war.

This study is a continuation of prior research presented in the previous editions of the Report [see, e.g., Próchniak 2019, 2022]. The 2020 edition of the study [Próchniak, 2020] additionally provided the economic growth account at sector level.

6.2. Changes in total factor productivity – theoretical background

The origins of growth accounting date back to the first half of the 20th century. The concept of total productivity and the view that labor is not the only production factor, and that in measuring the wealth of nations and productivity one should take

into account other factors, such as capital and land, were discussed in the economic literature in the 1930s [Griliches, 1996]. The first mentions of the input-output ratio appeared in Copeland's paper in 1937 [Griliches, 1996]. In the 1940s and 1950s, many studies were published – to a large extent independently – which included results of empirical research on TFP measurement. The first such study, conducted by Dutch economist Jan Tinbergen, was published in 1942. In the following years, further studies appeared, in which the authors examined the relationship between the volume of output and inputs [see, e.g., Tintner, 1944; Barton, Cooper, 1948; Johnson, 1950; Schmookler, 1952; Abramovitz, 1956; Kendrick, 1956; Ruttan, 1956].

Robert Solow was the first economist to formalize growth accounting [Solow, 1957]. Using the macroeconomic production function and differential calculus, he showed how the rate of economic growth can be divided into the part resulting from an increase in factors of production and the remaining part, referred to as Solow's residual. The latter shows what part of economic growth cannot be attributed to individual factors. Thus, it is a measure of technological progress, or TFP growth.

In the following years, further studies on growth accounting appeared, introducing new approaches and extensions of previously conducted research and containing new elements of empirical analysis [see, e.g., Solow, 1962; Griliches, 1964; Jorgenson, Griliches, 1967].

The decomposition of economic growth initiated by Solow forms the basis of modern growth accounting. The starting point of such an analysis is the macroeconomic production function. Its general form is as follows:

$$Y(t) = F\left(A(t), Z_1(t), \ldots, Z_n(t)\right), \tag{6.1}$$

where: Y – output (GDP), A – level of technology, Z_1, …, Z_n – measurable factors of production. Two or three measurable factors of production are usually taken into account in empirical research, namely: labor, physical capital, and possibly human capital.

The analysis in this edition of the report will be carried out for two measurable factor inputs: labor and physical capital.[1] The production function (6.1) therefore takes the following form:

$$Y(t) = F\left(A(t), L(t), K(t)\right). \tag{6.2}$$

[1] In the 2012 and 2014 editions of the study, in addition to the basic growth accounting model, an extended model was also estimated, which included human capital [Próchniak, 2012, 2014].

In order to decompose the rate of economic growth into individual components, equation (6.2) should be transformed into a form representing the growth rate of Y. For this purpose, we differentiate (6.2) with respect to time and then divide by Y. As a result, we obtain:

$$\frac{\dot{Y}}{Y} = \frac{\frac{\partial F(A,L,K)}{\partial A}\dot{A}}{Y} + \frac{\frac{\partial F(A,L,K)}{\partial L}\dot{L}}{Y} + \frac{\frac{\partial F(A,L,K)}{\partial K}\dot{K}}{Y}. \tag{6.3}$$

After multiplying the individual components on the right-hand side of equation (6.3) by A/A, L/L and K/K, respectively, we get:

$$\frac{\dot{Y}}{Y} = \frac{\frac{\partial F(A,L,K)}{\partial A}A}{Y}\frac{\dot{A}}{A} + \frac{\frac{\partial F(A,L,K)}{\partial L}L}{Y}\frac{\dot{L}}{L} + \frac{\frac{\partial F(A,L,K)}{\partial K}K}{Y}\frac{\dot{K}}{K}. \tag{6.4}$$

Equation (6.4) shows that the GDP growth rate is the weighted average of growth rates of three factors: technology, labor, and physical capital. The weights are the shares of individual factors in GDP, measured as the marginal product of the factor (at the whole economy level) multiplied by the amount of a given factor and divided by the volume of output.

6.3. Review of the literature

Research on the decomposition of economic growth and TFP estimates for Poland was also carried out by other Polish authors.[2] For example, Florczak and Welfe [2000] and Welfe [2001] calculate TFP in Poland in 1982–2000 on the basis of standard growth accounting, taking into account two factors of production: labor and physical capital (machinery and equipment or total fixed assets). In their study, the elasticity of production in relation to fixed assets, i.e., the share of physical capital in income, is calibrated at 0.5 or estimated on the basis of the production function. In another study by Welfe [2003], the author estimates TFP for Poland in 1986–2000 using various alternative values of physical capital share in income (from 0.25 to 0.7). Florczak [2011] estimates, using the Wharton method, the TFP values cleared of short-term demand fluctuations for Poland in 1970–2008 and then examines the determinants of total factor productivity.

[2] Due to volume constrains, the results contained in those studies will not be described in detail.

TFP estimates for Poland were also conducted by others, including: Zienkowski [2001], Rapacki [2002], Piątkowski [2004], and Ptaszyńska [2006]. Roszkowska [2005] and Tokarski, Roszkowska, and Gajewski [2005] performed growth accounting for voivodships in Poland, while Bolińska [2018], Dykas and Misiak [2018], and Dańska-Borsiak [2020] made such calculations for selected Polish districts (*powiats*). Zielińska-Głębocka [2004] estimated TFP for 100 industries in Poland, Ciołek and Umiński [2007] calculated the TFP growth rate in Polish domestic and foreign enterprises, while Doebeli and Kolasa [2005] used the index number decomposition method in growth accounting for Poland, Czechia and Hungary. Ulrichs and Gosińska [2020] estimated the parameters of sectoral production functions describing the contribution of variables representing the physical capital and labor to gross value added in Poland. Młynarzewska-Borowiec [2018] estimated the level and dynamics of TFP in EU countries, including Poland, in 2000–2014.

It is also worth referring to studies in this area conducted by the Statistics Poland (GUS) [Kotlewski, Błażej, 2016, 2018, 2020]. In those works, the cited authors use the KLEMS productivity account and estimate, inter alia, the contribution of multifactor productivity (MFP) to output growth. Empirical research is conducted both at national level (for Poland and for selected other EU member states), as well as at the level of Polish provinces (*voivodeships*) and individual sectors of the economy.

6.4. Method

The research method in this chapter is economic growth accounting In order to be able to calculate the TFP growth rate in an empirical study, additional assumptions should be made to equation (6.4) which shows the essence of economic growth accounting.

We assume, firstly, that the production function is characterized by Hicks-neutral technological progress. Thus, this function can be described as follows:

$$F(A, L, K) = A \cdot f(L, K). \tag{6.5}$$

As can be seen, Hicks-neutral technological progress means that variable A, representing the level of technology, occurs in the product with production function f, making the production volume dependent on measurable inputs. Technological progress augments both production factors to the same extent, without changing the marginal rate of technological substitution between them. For the production function (6.5),

the share of technology in income, i.e., the component $(\partial F/\partial A)\, A/Y$ in equation (6.4), equals 1. Equation (6.4) can then be written as:

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + \frac{\frac{\partial F(A,L,K)}{\partial L} L}{Y} \frac{\dot{L}}{L} + \frac{\frac{\partial F(A,L,K)}{\partial K} K}{Y} \frac{\dot{K}}{K}. \tag{6.6}$$

The above equation shows that the rate of economic growth equals the sum of technological progress (increase in TFP) and the average growth rate of labor and physical capital, weighted by the shares of both factors in income.

An additional assumption should also be made regarding the marginal products of both factors. The marginal product of labor and capital at the whole economy level is in fact non-measurable. We therefore assume that all markets are perfectly competitive and that no externalities exist. In this case, the marginal product of capital $\partial F/\partial K$ equals the price of capital r, while the marginal product of labor $\partial F/\partial L$ equals the wage rate w. By using s_K to describe the capital share of income (rK/Y) and s_L to describe the share of labor (wL/Y), equation (6.6) can be written as:

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + s_K \frac{\dot{K}}{K} + s_L \frac{\dot{L}}{L}. \tag{6.7}$$

Let us make an additional assumption that all income can be assigned to one of two factors of production: labor or physical capital, i.e., $Y = wL + rK$. In this case, the shares of labor and physical capital in income add up to 1: $s_K + s_L = 1$. Thus, formula (6.7) takes the following form:

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + s_K \frac{\dot{K}}{K} + (1 - s_K) \frac{\dot{L}}{L}. \tag{6.8}$$

Equation (6.8)[3] is the basis for standard growth accounting. From this equation, the TFP growth rate can be calculated as the difference between the GDP growth rate and the weighted average growth rate of both factors of production:

$$TFP\ growth = \frac{\dot{A}}{A} = \frac{\dot{Y}}{Y} - \left[s_K \frac{\dot{K}}{K} + (1 - s_K) \frac{\dot{L}}{L} \right]. \tag{6.9}$$

[3] This equation is in fact a Cobb-Douglas production function.

6.5. Empirical study results

For the purpose of the analysis, we have gathered data that form the following time series:

a) the rate of economic growth,
b) the rate of change in labor inputs,
c) the rate of change in physical capital input.

The rate of economic growth is the annual growth rate of total real GDP, sourced from the IMF database [IMF, 2022]. The rate of change in labor inputs is measured using the employment dynamics data provided by the International Labour Organization [ILO, 2022]. We have calculated the time series of the physical capital stock on the basis of the perpetual inventory method using the World Bank data [World Bank, 2022]. This method requires many assumptions to be taken into account. We have assumed that the depreciation rate is 5%, and the initial capital/output ratio is 3. In the perpetual inventory method, the initial year should be a little earlier than the years for which TFP is being calculated; in our study, we start calculations in 2000, which is the year to which the assumption of capital to output ratio of 3 applies. As investments, we use a variable measuring gross fixed capital formation. The shares of labor and physical capital in income equal one half.

In this edition of the study, we have updated all the time series of the analyzed variables. All steps of the analysis have been recalculated. Therefore, the documentation of the results has been fully presented in the text of the study and it does not duplicate the information contained in the previous editions of the Report.

Table 6.1 presents detailed results of economic growth decomposition, while Tables 6.2 and 6.3 summarize the data from Table 6.1.

Romania, Latvia, Slovenia, Poland, Lithuania, and Poland recorded the highest TFP growth rate over the entire period (more than 1% annually). In Romania, TFP rose on average by 2.3% annually, in Latvia by 1.6%, in Slovenia by 1.5%, and in Poland by 1.4%. Poland's performance should be considered a major success (compared with other new EU members). If taken as an approximate measure of technological progress, TFP changes put Poland among the leading EU-11 countries in creating new technologies. In the remaining EU-11 countries, the productivity growth rate did not exceed the annual average of 1%. Over the entire 10-year period, Croatia, Hungary, Bulgaria, and Czechia saw an average TFP growth of 0.2–0.8%, and in Slovakia the average TFP growth between 2012 and 2021 was zero.

In general, looking at the EU-11 group as a whole, the TFP growth rate was low in 2010–2020. As the analysis of data for the individual sub-periods will show, poor

results are attributable to a steep decline in total factor productivity in the countries under study in 2020, i.e., during the coronavirus pandemic. A recession witnessed in all the countries in 2020 led to negative TFP growth rates in 2020.

In this chapter, TFP growth is treated as an approximate measure of technological progress. However, TFP calculated as residual from the growth accounting framework has its drawbacks as an indicator of technological growth, which should be kept in mind when interpreting results. Firstly, the 2020 economic recession which resulted from exogenous factors and was not reflected that much in the accumulation of labor, and especially capital, which an outcome of investments made in earlier years, leads to negative estimates of the TFP growth rate in 2020. Secondly, the part of TFP which results from increased labor productivity should be partially considered as contribution of human capital to economic growth. Due to the difficulties in calculating this type of capital for the analyzed group of countries, TFP in our approach also includes the impact of human capital on economic growth.

The leading countries in terms of the rate of change in total factor productivity change over years. This results from the fact that economic growth accounting is an exercise whose results are strongly dependent on fluctuations of the individual variables (labor and capital inputs, volume of output). The variables (in particular, the volume of output) are subject to strong fluctuations year on year, which results from business cycles and irregular fluctuations triggered by various demand and supply shocks, both endogenous and exogenous. Therefore, the ranking of countries for TFP growth rate is subject to large changes between successive years. In analyses prepared many years ago, the Baltic states led the way in TFP dynamics. Prior to the 2008–2009 global crisis, they showed a very fast economic growth, which was difficult to explain by changes in labor and physical capital, which is why it was attributed to TFP. The position of Poland in those analyses was moderate – not as good as that of the Baltic states, nor was it trailing the group. The extension and shifting of the time horizon significantly changed the outcomes for individual countries in favor of Poland.

Table 6.1. The contribution of labor, physical capital, and TFP to economic growth in 2012–2021

		2012		2013			2014			2015			2016			2017			2018			2019			2020			2021		
		growth (%)	contribution (p.p.)	contribution (%)		growth (%)	contribution (p.p.)	contribution (%)		growth (%)	contribution (p.p.)	contribution (%)		growth (%)	contribution (p.p.)	contribution (%)		growth (%)	contribution (p.p.)	contribution (%)		growth (%)	contribution (p.p.)	contribution (%)		growth (%)	contribution (p.p.)	contribution (%)		growth (%)	contribution (p.p.)	contribution (%)
Bulgaria	L	–1.1	–0.5	–70		0.0	0.0	–3		1.6	0.8	82		1.7	0.8	25		–0.5	–0.2	–8		4.4	2.2	80		0.1	0.0	1		2.6	1.3	32		–1.4	–0.7	–17
	K	2.2	1.1	148		2.2	1.1	–197		2.1	1.0	108		2.2	1.1	32		2.2	1.1	36		1.6	0.8	29		1.7	0.8	32		1.9	1.0	24		2.0	1.0	24
	TFP	0.2	0.2	22		–1.7	–1.7	300		–0.9	–0.9	–90		1.5	1.5	43		2.2	2.2	72		–0.2	–0.2	–9		1.8	1.8	67		1.8	1.8	44		3.9	3.9	93
	GDP	0.8	0.8	100		–0.6	–0.6	100		1.0	1.0	100		3.4	3.4	100		3.0	3.0	100		2.8	2.8	100		2.7	2.7	100		4.0	4.0	100		4.2	4.2	100
Croatia	L	–3.6	–1.8	79		–2.7	–1.3	371		2.7	1.4	–395		1.3	0.6	25		0.3	0.1	4		2.2	1.1	32		1.8	0.9	32		1.5	0.7	21		–1.3	–0.7	8		1.3	0.6	6
	K	1.0	0.5	–22		0.7	0.3	–93		0.7	0.3	–100		0.5	0.3	10		1.0	0.5	13		1.2	0.6	17		1.2	0.6	21		1.4	0.7	20		1.9	0.9	–12		1.4	0.7	7
	TFP	–1.0	–1.0	43		0.6	0.6	–178		–2.1	–2.1	595		1.6	1.6	65		2.9	2.9	82		1.7	1.7	50		1.4	1.4	47		2.1	2.1	59		–8.4	–8.4	104		8.9	8.9	87
	GDP	–2.3	–2.3	100		–0.4	–0.4	100		–0.3	–0.3	100		2.5	2.5	100		3.5	3.5	100		3.4	3.4	100		2.9	2.9	100		3.5	3.5	100		–8.1	–8.1	100		10.2	10.2	100
Czechia	L	0.4	0.2	–23		1.0	0.5	–1045		0.8	0.4	17		1.4	0.7	13		1.9	1.0	38		1.6	0.8	16		1.4	0.7	21		0.2	0.1	3		–1.3	–0.6	12		–0.3	–0.2	–4
	K	3.0	1.5	–190		2.5	1.2	–2711		2.2	1.1	48		2.2	1.1	21		2.8	1.4	54		2.3	1.2	22		2.5	1.3	39		3.1	1.5	50		3.3	1.6	–30		2.4	1.2	35
	TFP	–2.5	–2.5	313		–1.8	–1.8	3856		0.8	0.8	36		3.6	3.6	67		0.2	0.2	8		3.2	3.2	62		1.3	1.3	40		1.4	1.4	47		–6.5	–6.5	118		2.4	2.4	70
	GDP	–0.8	–0.8	100		–0.0	–0.0	100		2.3	2.3	100		5.4	5.4	100		2.5	2.5	100		5.2	5.2	100		3.2	3.2	100		3.0	3.0	100		–5.5	–5.5	100		3.5	3.5	100
Estonia	L	1.9	1.0	30		1.0	0.5	36		0.6	0.3	9		1.3	0.6	34		0.9	0.5	15		1.8	0.9	16		1.0	0.5	13		0.9	0.4	12		–2.3	–1.2	211		1.1	0.6	7
	K	3.0	1.5	47		3.7	1.9	128		3.5	1.8	59		3.0	1.5	82		2.5	1.3	40		2.7	1.4	24		3.6	1.8	47		3.3	1.6	44		3.5	1.8	–318		4.8	2.4	30
	TFP	0.7	0.7	23		–0.9	–0.9	–64		1.0	1.0	32		–0.3	–0.3	–16		1.4	1.4	45		3.5	3.5	61		1.5	1.5	40		1.7	1.7	45		–1.1	–1.1	207		5.0	5.0	63
	GDP	3.2	3.2	100		1.5	1.5	100		3.0	3.0	100		1.9	1.9	100		3.2	3.2	100		5.8	5.8	100		3.8	3.8	100		3.7	3.7	100		–0.6	–0.6	100		8.0	8.0	100
Hungary	L	1.8	0.9	–66		1.7	0.9	46		5.3	2.7	63		2.7	1.3	35		3.4	1.7	73		1.6	0.8	19		1.1	0.5	10		1.0	0.5	10		–1.1	–0.6	13		4.1	2.0	29
	K	1.1	0.5	–38		0.8	0.4	22		1.3	0.7	16		2.0	1.0	26		2.2	1.1	48		1.3	0.7	15		2.5	1.2	23		3.5	1.7	38		4.2	2.1	–47		3.2	1.6	23
	TFP	–2.8	–2.8	204		0.6	0.6	32		0.9	0.9	21		1.5	1.5	39		–0.5	–0.5	–21		2.8	2.8	66		3.6	3.6	67		2.3	2.3	52		–6.0	–6.0	134		3.5	3.5	49
	GDP	–1.4	–1.4	100		1.9	1.9	100		4.2	4.2	100		3.8	3.8	100		2.3	2.3	100		4.3	4.3	100		5.4	5.4	100		4.6	4.6	100		–4.5	–4.5	100		7.1	7.1	100

		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021	
		growth (%)	contribution (p.p.)	growth (%)	contribution (p.p.)	growth (%)	contribution (p.p.)	growth (%)	contribution (p.p.)	growth (%)	contribution (p.p.)	growth (%)	contribution (p.p.)	growth (%)	contribution (p.p.)	growth (%)	contribution (p.p.)	growth (%)	contribution (p.p.)	growth (%)	contribution (p.p.)
Latvia	L	1.6	0.8	2.1	1.0	−1.0	−0.5	1.3	0.6	−0.3	−0.2	0.2	0.1	1.6	0.8	1.9	1.0	−1.9	−0.9	−2.6	−1.3
	K	2.1	1.1	3.2	1.6	2.6	1.3	2.1	1.1	1.9	0.9	1.2	0.6	1.8	0.9	2.3	1.2	2.8	1.4	2.6	1.3
	TFP	5.1	5.1	−0.6	−0.6	1.1	1.1	2.2	2.2	1.6	1.6	2.6	2.6	2.3	2.3	1.2	1.2	−4.2	−4.2	4.5	4.5
	GDP	7.0	7.0	2.0	2.0	1.9	1.9	3.9	3.9	2.4	2.4	3.3	3.3	4.0	4.0	2.5	2.5	−3.8	−3.8	4.5	4.5
	L	100	12	100	52	100	−27	100	17	100	−7	100	3	100	20	100	1	100	25	100	−29
	K	100	15	100	80	100	69	100	28	100	39	100	18	100	23	100	50	100	−37	100	29
	TFP	100	73	100	−32	100	58	100	56	100	67	100	80	100	57	100	49	100	112	100	100
	GDP	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Lithuania	L	1.8	0.9	2.1	0.7	2.0	1.0	1.2	0.6	1.0	39	−0.5	−0.2	1.5	0.7	1.8	0.3	−1.5	−0.7	557	8
	K	2.4	1.2	2.1	1.0	2.5	1.3	2.8	1.4	1.5	58	3.0	1.5	3.4	1.7	4.0	2.0	4.2	2.1	−1585	37
	TFP	1.8	1.8	1.8	1.8	1.3	1.3	0.0	0.0	0.1	3	3.0	3.0	1.6	1.6	2.5	2.5	−1.5	−1.5	1128	56
	GDP	3.8	3.8	3.6	3.6	3.5	3.5	2.0	2.0	2.5	2.5	4.3	4.3	4.0	4.0	4.6	4.6	−0.1	−0.1	100	100
	L	0.2	0.1	−0.1	−0.1	1.9	0.9	1.4	0.7	0.7	0.4	1.4	0.7	0.4	0.2	−0.1	−0.1	−0.1	−0.1	3	11
	K	3.3	1.6	2.9	1.4	2.6	1.3	3.1	1.6	3.4	1.7	2.4	1.2	2.5	1.3	3.0	1.5	3.3	1.6	−74	19
	TFP	−0.4	−0.4	−0.2	−0.2	1.1	1.1	2.0	2.0	1.1	1.1	2.9	2.9	3.9	3.9	3.3	3.3	−3.8	−3.8	172	69
	GDP	1.3	1.3	1.1	1.1	3.4	3.4	4.2	4.2	3.1	3.1	4.8	4.8	5.4	5.4	4.7	4.7	−2.2	−2.2	100	100
	L	0.9	0.5	−0.6	−0.3	0.8	0.4	−0.9	−0.5	−1.0	−0.5	2.6	1.3	0.2	0.1	−0.1	−0.0	−1.8	−0.9	24	−76
	K	3.8	1.9	3.8	1.9	2.9	1.5	3.0	1.5	3.3	1.7	3.0	1.5	3.1	1.5	2.7	1.4	3.5	1.8	−47	30
	TFP	−0.3	−0.3	−1.6	−2.2	1.8	1.8	1.9	1.9	3.6	3.6	4.5	4.5	2.8	2.8	2.9	2.9	−4.6	−4.6	122	146
	GDP	2.0	2.0	3.8	3.8	3.6	3.6	3.0	3.0	4.7	4.7	7.3	7.3	4.5	4.5	4.2	4.2	−3.7	−3.7	100	100
	L	0.6	0.3	0.0	0.0	1.5	0.7	1.3	1.3	2.8	1.4	1.5	0.8	1.4	0.7	0.7	0.3	−2.0	−1.0	23	19
	K	3.7	1.9	2.6	1.3	2.5	1.2	2.5	1.3	3.9	2.0	2.8	1.4	2.8	1.4	2.8	1.4	3.1	1.5	−35	32
	TFP	−0.8	−0.8	−0.6	−0.6	0.8	0.8	2.7	2.7	−1.4	−1.4	0.8	0.8	1.7	1.7	0.9	0.9	−4.9	−4.9	112	49
	GDP	1.4	1.4	0.7	0.7	2.7	2.7	5.2	5.2	1.9	1.9	3.0	3.0	3.8	3.8	2.6	2.6	−4.4	−4.4	100	100
	L	−1.3	−0.7	−1.9	−1.0	1.2	0.6	0.1	0.0	−0.3	−0.1	4.8	2.4	2.2	1.1	0.2	0.1	−0.5	−0.2	5	−4
	K	1.0	0.5	0.4	0.2	0.6	0.3	0.5	0.3	0.4	0.2	0.2	0.1	0.7	0.4	1.3	0.6	1.5	0.8	−18	5
	TFP	−2.5	−2.5	−0.3	−0.3	1.9	1.9	1.9	1.9	3.1	3.1	2.3	2.3	3.0	3.0	2.7	2.7	−4.8	−4.8	112	99
	GDP	−2.6	−2.6	−1.0	−1.0	2.8	2.8	2.2	2.2	3.2	3.2	4.8	4.8	4.5	4.5	3.5	3.5	−4.3	−4.3	100	100
Slovakia	L	0.6	0.3	0.0	0.0	1.5	0.7	1.3	1.3	2.8	1.4	1.5	0.8	1.4	0.7	0.7	0.3	−2.0	−1.0	23	19
	K	3.7	1.9	2.6	1.3	2.5	1.2	2.5	1.3	3.9	2.0	2.8	1.4	2.8	1.4	2.8	1.4	3.1	1.5	−35	32
	TFP	−0.8	−0.8	−0.6	−0.6	0.8	0.8	2.7	2.7	−1.4	−1.4	0.8	0.8	1.7	1.7	0.9	0.9	−4.9	−4.9	112	49
	GDP	1.4	1.4	0.7	0.7	2.7	2.7	5.2	5.2	1.9	1.9	3.0	3.0	3.8	3.8	2.6	2.6	−4.4	−4.4	100	100
	L	100	25	100	94	100	22	100	2	100	−4	100	50	100	25	100	3	100	5	100	−4
	K	100	18	100	198	100	46	100	24	100	101	100	47	100	37	100	54	100	−35	100	32
	TFP	100	93	100	−99	100	28	100	51	100	−74	100	27	100	44	100	34	100	112	100	49
	GDP	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Romania	L	0.9	0.5	−0.6	−0.3	0.8	0.4	−0.9	−0.5	−1.0	−0.5	2.6	1.3	0.2	0.1	−0.1	−0.0	−1.8	−0.9	24	−76
	K	3.8	1.9	3.8	1.9	2.9	1.5	3.0	1.5	3.3	1.7	3.0	1.5	3.1	1.5	2.7	1.4	3.5	1.8	−47	30
	TFP	−0.3	−0.3	−1.6	−2.2	1.8	1.8	1.9	1.9	3.6	3.6	4.5	4.5	2.8	2.8	2.9	2.9	−4.6	−4.6	122	146
	GDP	2.0	2.0	3.8	3.8	3.6	3.6	3.0	3.0	4.7	4.7	7.3	7.3	4.5	4.5	4.2	4.2	−3.7	−3.7	100	100
	L	100	22	0.0	0.0	1.5	0.7	1.3	1.3	2.8	1.4	1.5	0.8	1.4	0.7	0.7	0.3	−2.0	−1.0	23	19
	K	100	138	2.6	1.3	2.5	1.2	2.5	1.3	3.9	2.0	2.8	1.4	2.8	1.4	2.8	1.4	3.1	1.5	−35	32
	TFP	100	−60	−0.6	−0.6	0.8	0.8	2.7	2.7	−1.4	−1.4	0.8	0.8	1.7	1.7	0.9	0.9	−4.9	−4.9	112	49
	GDP	100	100	0.7	0.7	2.7	2.7	5.2	5.2	1.9	1.9	3.0	3.0	3.8	3.8	2.6	2.6	−4.4	−4.4	100	100
	L	100	25	−1.9	−1.0	1.2	0.6	0.1	0.0	−0.3	−0.1	4.8	2.4	2.2	1.1	0.2	0.1	−0.5	−0.2	5	−4
	K	100	−18	0.4	0.2	0.6	0.3	0.5	0.3	0.4	0.2	0.2	0.1	0.7	0.4	1.3	0.6	1.5	0.8	−18	5
	TFP	100	93	−0.3	−0.3	1.9	1.9	1.9	1.9	3.1	3.1	2.3	2.3	3.0	3.0	2.7	2.7	−4.8	−4.8	112	99
	GDP	100	100	−1.0	−1.0	2.8	2.8	2.2	2.2	3.2	3.2	4.8	4.8	4.5	4.5	3.5	3.5	−4.3	−4.3	100	100

Source: compiled by author.

Table 6.2. TFP growth rates (%)

Country	Entire period 2011–2020			2012–2015	2016–2019	2020	2021
	average	minimum	average	average	average		
Bulgaria	0.5	−3.7	3.9	−0.2	1.4	−3.7	3.9
Croatia	0.8	−8.4	8.9	−0.2	2.0	−8.4	8.9
Czechia	0.2	−6.5	3.6	0.0	1.5	−6.5	2.4
Estonia	1.2	−1.1	5.0	0.1	2.0	−1.1	5.0
Lithuania	1.3	−1.5	3.0	1.2	1.8	−1.5	2.8
Latvia	1.6	−4.2	5.1	1.9	1.9	−4.2	4.5
Poland	**1.4**	**−3.8**	**4.1**	**0.6**	**2.8**	**−3.8**	**4.1**
Romania	2.3	−4.6	8.6	1.4	3.4	−4.6	8.6
Slovakia	0.0	−4.9	2.7	0.5	0.5	−4.9	1.5
Slovenia	1.5	−4.8	8.1	0.3	2.8	−4.8	8.1
Hungary	0.6	−6.0	3.6	0.0	2.1	−6.0	3.5

Source: compiled by author.

Table 6.3. Contribution of TFP to economic growth (%)

Country	Entire period 2011–2020		
	average	minimum	average
Bulgaria	63	−90	300
Croatia	95	−178	595
Czechia	462	8	3856
Estonia	43	−64	207
Lithuania	149	2	1128
Latvia	62	−32	112
Poland	**51**	**−31**	**172**
Romania	69	−16	146
Slovakia	11	−99	112
Slovenia	77	26	112
Hungary	64	−21	204

Source: compiled by author.

Croatia, Romania, Slovenia, and Czechia reported the highest variance in TFP growth rates in the years under study. The differentiation of the dynamics of productivity changes in these countries resulted mainly from a steep decline in TFP in 2020 due to a deep recession in the wake of the coronavirus pandemic. For example, in Croatia and Czechia, real GDP dropped by 5%, and these were the two countries in the EU-11

group to experience the steepest recession in 2020. In the four countries mentioned above, the disparity between the highest and the lowest TFP growth rates in 2012–2021 was more than 10 p.p. In the other CEE states, the spread of TFP growth rates was also high, ranging from 4.5 p.p. in Lithuania to 9.6 p.p. in Hungary. Large disparities in TFP fluctuations result from substantial declines in productivity witnessed in 2020 in all countries due to the coronavirus pandemic. In Poland, the lowest TFP growth rate in the analyzed period occurred in 2020 (–3.8%), and the highest in 2021 (4.1%).

Data for individual sub-periods shows different behavior of countries as regards TFP dynamics. In general, TFP growth rates in both identified sub-periods were not particularly high.

In 2012–2015, two countries of the group under study (Bulgaria and Croatia) recorded a negative TFP growth rate. Of course, the TFP decline can hardly be treated as a technological regression – this result is a consequence of using the residual method of TFP calculation. Nevertheless, the negative values do not imply success in terms of productivity changes. Two other countries (Czechia and Hungary) reported no changes in TFP. During that period, Latvia, Romania, and Lithuania were the leaders in total factor productivity dynamics, with an average TFP growth rate of more than 1%.

In the following sub-period 2016–2019, no country reported a negative TFP growth rate. Apart from Latvia and Slovakia, in 2016–2019 productivity growth was faster than in 2012–2015 (Latvia and Slovakia also recorded the same summary results in both subperiods). In 2016–2019, the leaders in TFP dynamics were Romania (3.4%) and Poland and Slovenia (2.8%). Poland's high position is particularly noteworthy, which arises from the favorable economic situation and good macroeconomic performance of Polish economy in the latter part of the 2010s.

In 2020, there was a rapid deterioration of performance in terms of changes in total factor productivity. All EU-11 member states recorded a negative TFP growth rate. The slowest decline in TFP was observed in Estonia (−1.1%), Lithuania (−1.5%), Bulgaria (−3.7%), and Poland (−3.8%). The worst performers were Hungary (−6.0%), Czechia (−6.5%), and Croatia (−8.4%). Negative TFP growth rates result from the recession experienced in all the EU-11 member states in 2020 due to the COVID-19 pandemic. In 2020, the EU-11 countries also reported a decline in employment. On the other hand, the physical capital stock increased in these countries. The increase in capital stock results from the fact that capital expenditure is an outcome of investment undertaken in earlier years, when nobody expected an outbreak of a global pandemic. The perpetual inventory method we have employed to estimate the volume of capital in 2020 draws on 2019 investment data (and prior years). Therefore, with a good economic situation in 2019, investment was high and the capital stock in all countries of the group concerned increased in 2020 at a faster rate than in 2019.

In 2021, despite the continuing coronavirus pandemic, TFP growth trends rapidly reversed. This is due to the fact that the countries under study overcame the recession and production started to rise relatively quickly again. As the recession had led to a low GDP, production rebounds from a low base yielded very high percentage changes. In many CEE countries, the rate of economic growth was impressive in 2021. Croatia saw a two-digit economic growth (10.2%). Slovenia, Estonia and Hungary also recorded very high GDP growth rates (8.2%, 8.0%, and 7.1%, respectively). In 2021, Poland performed satisfactorily in terms of GDP growth rate (5.9%) – the same as Romania.

Consequently, the EU-11 countries recorded rapid gains in total factor productivity in 2021. The leaders were Croatia, Romania, and Slovenia, where TFP grew at a rate of more than 8%. The next three places were taken by Estonia (5.0%), Latvia (4.5%), and Poland (4.1%). The worst performers in 2021 in terms of TFP dynamics were Lithuania, Czechia, and Slovakia, where the productivity growth did not exceed 3%.

As regards TFP contribution to economic growth, the numerical values for the period under study are partly distorted, inter alia, by the fact that positive TFP dynamics during recession means a negative TFP contribution to economic growth (example of Croatia in 2013). On the other hand, when there is a strong economic slowdown and the GDP growth rate is close to 0%, a change of a few percent in total factor productivity translates into a several thousand percent TFP contribution to economic growth (e.g., Czechia in 2013). The coronavirus pandemic has also disrupted the statistics on TFP contribution to economic growth. Nevertheless, certain trends and regularities can be determined on the basis of aggregated results for the whole period.

As indicated by the data presented in Table 6.3, the percentage contributions of TFP to economic growth in most countries (except Czechia, Lithuania, Croatia, and Slovakia) ranged between 43% and 77% in 2012–2021. This confirms the important role of TFP in the economic growth of the analyzed countries in the past ten years. In Poland, the TFP contribution to GDP growth averaged 51% in 2012–2021.

6.6. Conclusions

The results show that changes in productivity played a significant role in the economic growth of Poland and the other EU-11 countries. In Poland, the average TFP growth rate amounted to 1.4% annually between 2012 and 2022, which was the fourth best result in the EU-11 group (the leader was Romania with a 2.3% productivity growth rate; Lithuania and Latvia also performed better than Poland). TFP growth in Poland should be interpreted as an improvement of the competitiveness of the Polish economy. Higher efficiency of production factors means an increase in management

efficiency and a better competitive position in the international environment. The coronavirus pandemic has had a highly adverse impact on TFP dynamics. All the EU-11 countries recorded a decline in total factor productivity in 2020 (from −1.1% in Estonia to −8.4% in Croatia). However, in the second year of the pandemic, having weathered the recession and embarked on a faster economic growth path, the CEE countries saw very good performance in terms of changes in total factor productivity (TFP increase from 1.5% in Slovakia to 8.9% in Croatia).

Bibliography

Abramovitz, M. (1956). Resource and Output Trends in the United States since 1870, *American Economic Review*, 46, pp. 5–23.

Barton, G.T., Cooper, M.R. (1948). Relation of Agricultural Production to Inputs, *Review of Economics and Statistics*, 30, pp. 117–126.

Bolińska, M. (2018). Zróżnicowanie łącznej produktywności czynników produkcji w powiatach województwa podkarpackiego, *Humanities and Social Sciences*, 23(2), pp. 49–63.

Ciołek, D., Umiński, S. (2007). Transfer technologii przez zagranicznych inwestorów, *Ekonomista*, 2, pp. 221–234.

Dańska-Borsiak, B. (2020). PKB i TFP w powiatach województwa wielkopolskiego. Oszacowanie i ocena zróżnicowania, *Rozwój Regionalny i Polityka Regionalna*, 52, pp. 11–28.

Doebeli, B., Kolasa, M. (2005). Rola zmian cen dóbr handlowych we wzroście dochodu krajowego Polski, Czech i Węgier, *Gospodarka Narodowa*, 9, pp. 25–45.

Dykas, P., Misiak, T. (2018). Przestrzenne zróżnicowanie łącznej produktywności czynników produkcji w grupach powiatów, *Studia Prawno-Ekonomiczne*, 109, pp. 205–224.

Florczak, W. (2011). Ekonometryczna analiza makro-uwarunkowań wzrostu gospodarczego Polski, *Prace i Materiały Wydziału Zarządzania Uniwersytetu Gdańskiego*, 4(8), pp. 75–92.

Florczak, W., Welfe, W. (2000). Wyznaczanie potencjalnego PKB i łącznej produktywności czynników produkcji, *Gospodarka Narodowa*, 164 (11–12), pp. 40–55.

Griliches, Z. (1964). Research Expenditures, Education, and the Aggregate Agricultural Production Function, *American Economic Review*, 54, pp. 961–974.

Griliches, Z. (1996). The Discovery of the Residual: A Historical Note, *Journal of Economic Literature*, 34, pp. 1324–1330.

ILO (2021). *Ilostat Database*, https://ilostat.ilo.org/data/ (accessed: 03.11.2021).

IMF (2021). *World Economic Outlook Database. October 2021*, http://www.imf.org (accessed: 02.11.2021).

Johnson, D.G. (1950). The Nature of the Supply Function for Agricultural Products, *American Economic Review*, 40, pp. 539–564.

Jorgenson, D.W., Griliches, Z. (1967). The Explanation of Productivity Change, *Review of Economic Studies*, 34, pp. 249–283.

Kendrick, J.W. (1956). Productivity Trends: Capital and Labor, *Review of Economics and Statistics*, 38, pp. 248–257.

Kotlewski, D., Błażej, M. (2016). Metodologia rachunku produktywności KLEMS i jego implementacja w warunkach polskich, *Wiadomości Statystyczne*, 91(664), pp. 86–108.

Kotlewski, D., Błażej, M. (2018). *Rachunek produktywności KLEMS – Polska 2005–2016.* Warsaw: Statistics Poland.

Kotlewski, D., Błażej, M. (2020). Sustainability of the Convergence Between Polish and EU Developed Economies in the Light of KLEMS Growth Accounting, *Bank i Kredyt*, 51(2), pp. 121–142.

Młynarzewska-Borowiec, I. (2018). Łączna produktywność czynników produkcji (TFP) i jej zróżnicowanie w krajach Unii Europejskiej, *Acta Universitatis Lodziensis. Folia Oeconomica*, 3(335), pp. 109–122.

Piątkowski, M. (2004). Wpływ technologii informacyjnych na wzrost gospodarczy i wydajność pracy w Polsce w latach 1995–2000, *Gospodarka Narodowa*, 189(1–2), pp. 37–52.

Próchniak, M. (2012). Total Factor Productivity. In: *Poland: Competitiveness Report 2012. Focus on Education* (pp. 198–212), M.A. Weresa (Ed.). Warsaw: SGH Publishing House.

Próchniak, M. (2014). Changes in Total Factor Productivity in 2004–2013 and the Competitiveness of the Polish Economy. In: *Poland: Competitiveness Report 2014. A Decade in the European Union* (pp. 201–213), M.A. Weresa (Ed.). Warsaw: SGH Publishing House.

Próchniak, M. (2019). Changes in Total Factor Productivity in the Fourth Industrial Revolution Era. In: *Poland: Competitiveness Report 2019. International Competitiveness in the Context of Development of Industry 4.0* (pp. 231–244), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Próchniak, M. (2020). Changes in Total Factor Productivity, with a Particular Focus on the Service Sector. In: *Poland: Competitiveness Report 2020. Focus on Service Sector* (pp. 193–215), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Próchniak, M. (2022). Changes in Total Factor Productivity. In: *Poland: Competitiveness Report 2022. Towards a Sustainable Economy in a Pandemic Era* (pp. 133–147), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Ptaszyńska, B. (2006). Wzrost gospodarczy w Polsce w latach transformacji systemowej, *Wiadomości Statystyczne*, 2, pp. 44–53.

Rapacki, R. (2002). Możliwości przyspieszenia wzrostu gospodarczego w Polsce, *Ekonomista*, 4, pp. 469–493.

Roszkowska, S. (2005). Kapitał ludzki a wzrost gospodarczy w ujęciu wojewódzkim, *Wiadomości Statystyczne*, 4, pp. 46–67.

Ruttan, V.W. (1956). The Contribution of Technological Progress to Farm Output: 1950–75, *Review of Economics and Statistics*, 38, pp. 61–69.

Schmookler, J. (1952). The Changing Efficiency of the American Economy, 1869–1938, *Review of Economics and Statistics*, 34, pp. 214–231.

Solow, R.M. (1957). Technical Change and the Aggregate Production Function, *Review of Economics and Statistics*, 39, pp. 312–320.

Solow, R.M. (1962). Technical Progress, Capital Formation, and Economic Growth, *American Economic Review*, 52, pp. 76–86.

Tintner, G. (1944). A Note on the Derivation of Production Functions from Farm Records, *Econometrica*, 12, pp. 26–34.

Tokarski, T., Roszkowska, S., Gajewski, P. (2005). Regionalne zróżnicowanie łącznej produktywności czynników produkcji w Polsce, *Ekonomista*, 2, pp. 215–244.

Ulrichs, M., Gosińska, E. (2020). Sektorowe funkcje produkcji – wnioski z modeli panelowych dla Polski, *Gospodarka Narodowa. The Polish Journal of Economics*, 302(2), pp. 71–94.

Welfe, W. (2001). Czynniki wzrostu potencjału gospodarczego Polski, *Ekonomista*, 2, pp. 177–200.

Welfe, W. (2003). Łączna produktywność czynników produkcji a postęp techniczny, *Studia Ekonomiczne*, 1–2, pp. 99–115.

World Bank (2021). *World Development Indicators Database*, http://databank.worldbank.org (accessed: 03.11.2021).

Zielińska-Głębocka, A. (2004). Analiza produkcyjności polskiego przemysłu. Aspekty metodyczne i empiryczne, *Ekonomista*, 3, pp. 335–358.

Zienkowski, L. (2001). Wydajność pracy i kapitału w Polsce, *Wiadomości Statystyczne*, 2, pp. 36–49.

Part III

Competitive Ability and the Role of Entrepreneurship

Chapter 7

Capital and Its Role for Entrepreneurship Development

Waldemar Milewicz

7.1. Introduction

Business financing is one of the key tasks in an enterprise. Finance planning and structuring means providing sufficient liquidity in the form of cash and other liquid assets to meet business objectives. Efficient financial management, ensuring financial liquidity, is essential for a business, like supplying the human body with nutrients through blood circulation. Shorter product life cycles, shorter investment cycles, economic fluctuations, and increasing competitive pressure cause companies to aim at future-oriented active financial management [Frei, Lantschner, Völser, 2014].

In addition, the financing of enterprises is of great economic importance. The capital structure, i.e., the debt to equity ratio and the maturity of debt financing, determine how resilient companies are to economic crises and how strongly changes in interest rates affect their financing costs. In other words, financing costs are an important factor determining the development of a company's profits.

The European (including Polish) business financing system is believed to be dominated by banks. Traditionally, Polish companies are considered to be financed by banking institutions, unlike, e.g., the USA, where the main role is played by capital market-based financing. For example, in the euro area, the share of bank loans in the debt capital of non-financial corporations is 88.3%, while in the USA the share of corporate bonds in debt capital is 86.4% [Hüther, Voigtländer, Haas, Deschermeier, 2015]. This chapter will describe the current structure of business financing in Poland, with a particular focus on the pandemic year 2020. The aim of the chapter is to present the current structure of corporate financing in Poland and show to what extent the outbreak of the pandemic has contributed to changing the status quo in this regard. At the outset, the theoretical basis of the available ways of financing companies is presented, paying attention to the practice in this area among small and medium-sized enterprises in Poland. Next, reference was made to the significant role of credit

and loans and how pandemic conditions have affected the share of this form of financing among Polish companies. This subsection, in turn, provided the impetus for referring to the next subsection, which is devoted to the role of government aid programs in financing businesses. This is followed by a description of the importance of a relatively new method of corporate financing, i.e., leasing, while remaining in the spirit of recent changes in the sources of capital in Polish companies. In the final section, more attention is paid to the less popular forms of foreign capital in Polish companies that are inextricably linked to the capital market, i.e., bonds, shares and private equity.

7.2. Capital – theoretical approach

Under the traditional approach, capital falls into two categories:

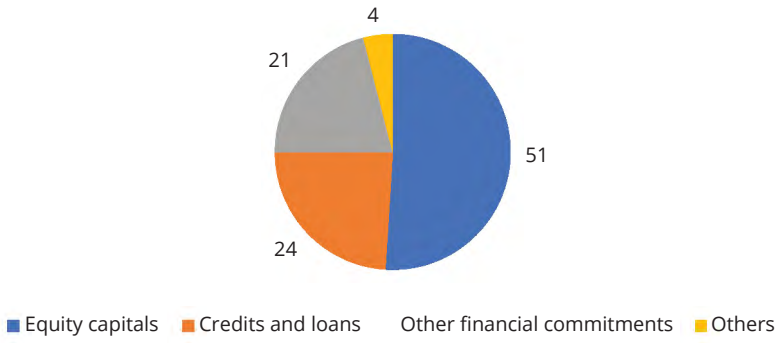
1) equity capital,
2) debt capital.

The division into equity and debt is directly related to the sources of financing operations. According to the division adopted by Grzywacz [2015], the equity capital category can be broken down into:

a) internal capital (comprising profit, depreciation/amortization charges, disposal of assets, acceleration of capital turnover),
b) external capital (comprising increase of shares, shareholder contributions, share issue, venture capital).

In contrast, debt capital consists exclusively of external capital including credit facility, loan, trade credit, debt securities, leasing, factoring, grants and subsidies, aid funds.

Figure 7.1. Forms of financing Polish enterprises in the structure of liabilities in 2020 (%)

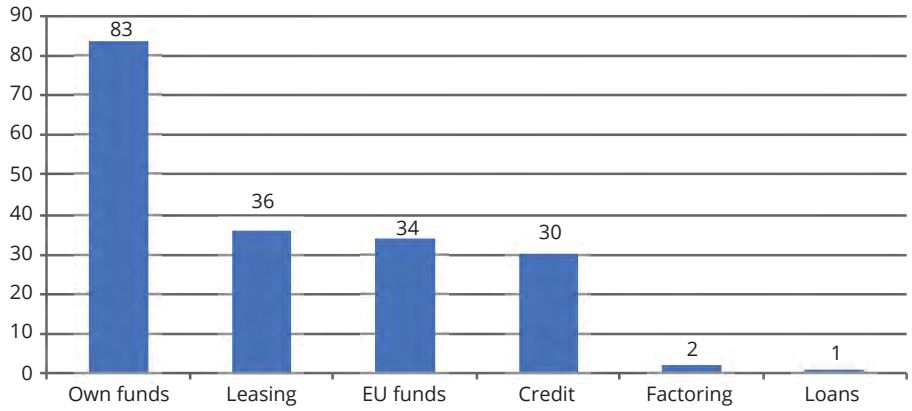


Source: Grzywacz [2021, p. 14].

Bearing in mind the above, it is worth noting in this context that according to various studies, the enterprise's own funds and credit remain the main sources of capital in Poland (Figure 7.1).

This division is similar also for small and medium-sized enterprises, with some minor differences visible (Figure 7.2).

Figure 7.2. Sources of financing of the small (including micro) enterprise sector in Poland in 2020 (%)



Source: Grzywacz [2021, p. 14].

The unambiguous conclusion from both figures is that in 2020 equity was the main source of financing for Polish enterprises. In other years, this form of financing has traditionally also prevailed for domestic enterprises. Earned profit, which is allocated primarily to current operations, turns out to be of crucial significance. However, it serves the implementation of investment projects to a small extent only. This phenomenon is noticeable primarily in smaller businesses [Grzywacz, 2021].

7.3. Credit facilities and loans in business financing

Despite the high importance of credit facilities and loans in financing Polish enterprises throughout the transformation period, their role decreased during the pandemic. In 2020, the growth of lending to non-financial corporations was seen to be steadily decreasing. The lockdown[1] imposed by the Polish government led to a dramatic

[1] On 13 March 2020, the first restrictions on economic activity were imposed: limiting the operation of shopping malls, a ban on public, state, and religious gatherings of more than 50 people, restaurants

decline in business income. This contraction in the scale of business activity contributed to a reduction in the demand for credit. This can be seen very well in the Table 7.1.

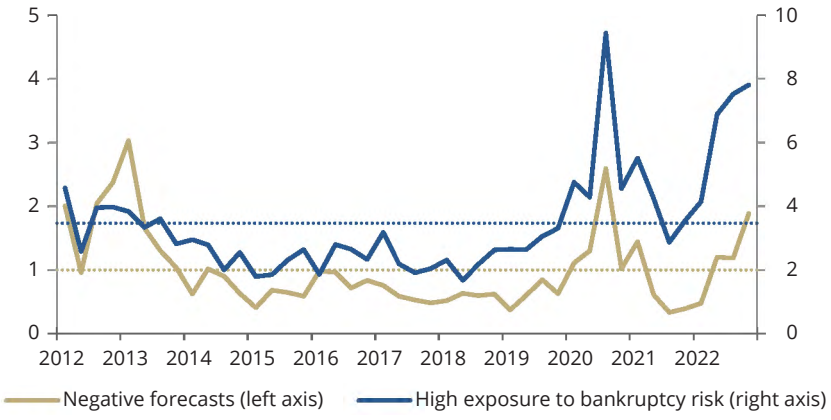
Table 7.1. Credit facilities and advances to non-financial sector enterprises in Poland

	December 2018	December 2019	December 2020	Change 2020/2019 (y/y)	
	PLN billions			PLN billions	%
Total enterprises	373.1	383.9	367.6	−16.2	−4.2
Large enterprises	167.7	178.5	169.7	−8.7	−4.9
SMEs	205.3	205.4	197.9	−7.5	−3.7

Source: KNF [2021a, p. 19].

According to the results of research (e.g., at NBP) one of the first adjustment measures taken by enterprises in response to the economic lockdown was to reduce investment expenditures. In other words, the investment demand of enterprises was reduced [Boguszewski, 2020]. However, the low propensity of enterprises to take out investment loans did not have a negative impact on the volume of investment loans taken – the annual growth rate of these loans remained positive.

Figure 7.3. Percentage of enterprises with high exposure to bankruptcy risk and negative forecasts (%)



Source: NBP [2022].

The demand for credit was suppressed not only by the reduction in the scale of operations in the conditions of the pandemic, but also by uncertainty about the

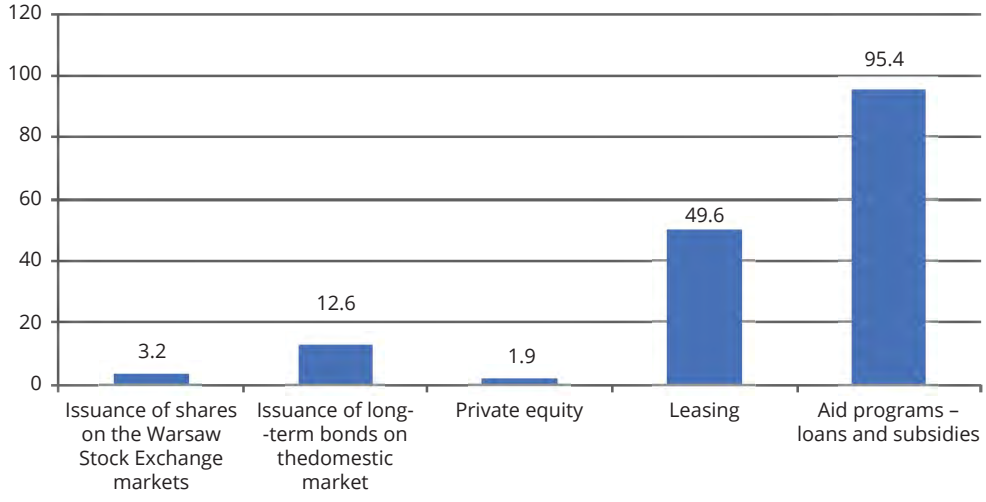
being allowed to only provide takeaway food, closure of gyms, swimming pools, dance clubs, fitness clubs, museums, libraries, and cinemas [ZPP, 2021, p. 3].

future. In particular, a strong increase in uncertainty was witnessed in companies that experienced a decrease in production and sales. In addition, the risk of high volatility of the economic environment was also related to the scale of the slowdown, caused mainly by administrative restrictions. It exceeded the expectations of enterprises, voiced in the first half of March, i.e., when COVID-19 appeared in Poland. The most important area in which the uncertainty associated with the coronavirus pandemic materialized is the highest percentage of enterprises at high risk of bankruptcy ever recorded in survey (Figure 7.3). Of course, this aspect was also relevant to the propensity of enterprises to use credit.

7.4. The role of government aid schemes in business financing

The pandemic described above set a specific trend in the use of external non-bank sources of financing. In the face of the pandemic restrictions, Polish enterprises were not able to guarantee regular credit repayment and thus were "doomed" to government aid. In order to counteract the negative socio-economic effects of the COVID-19 pandemic, the Polish government took a number of measures as part of its aid schemes. This was reflected in a significant volume of government aid schemes in relation to other non-bank external sources of financing for Polish enterprises.

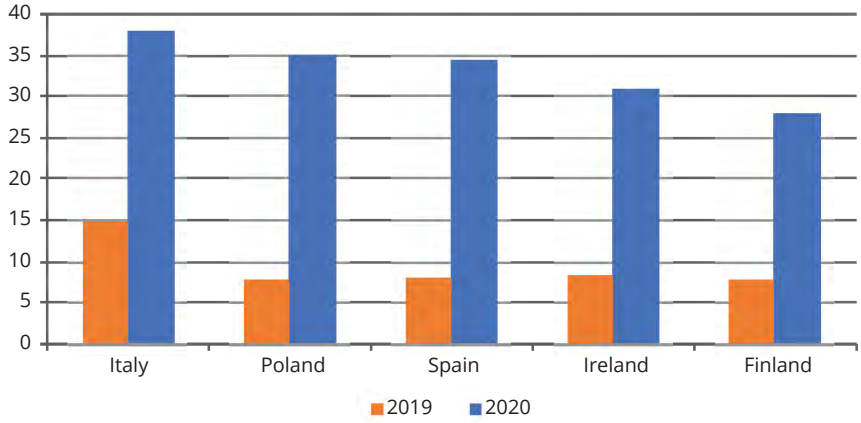
Figure 7.4. Selected non-bank external sources of financing for Polish enterprises in 2020 (PLN billions)



Source: compiled by author based on data from Fitch Poland, GUS (Statistics Poland), KDPW, GPW, Invest Europe, PFR, ZUS.

It is also worth pointing out the importance of government aid in Poland, in the form of a grant or subsidized bank loans,[2] compared to other EU countries. This is depicted in the figure below.

Figure 7.5. Percentage of small and medium-sized enterprises using grants or subsidized bank loans in EU member states in 2019–2020 (%)



Source: European Commission [2019, 2020].

Referring to the title of this chapter, it should be noted here that the support provided by government institutions in the form of various financial instruments was aimed at developing entrepreneurship suppressed by COVID-19. The pandemic that public authorities had to face required measures to be taken. They took the form of regulatory arrangements that allowed public funds to be mobilized. As early as 21 March 2020, the government presented a package of measures. They were intended for beneficiaries including enterprise, local governments, and employees as well as economy at large. It was branded "Anti-Crisis Shield". Its aim was to limit the effects of the pandemic by achieving economic stability and stimulating investment.

The arrangements included the following measures:

- deferral of certain fiscal obligations, such as retail sales tax payment;
- subsidies to interest rates on bank loans granted to entities affected by COVID-19;
- improving the financial liquidity of enterprises;
- securing jobs and employee incomes, and providing solutions to enable and improve task performance;
- enabling CIT and PIT taxpayers to deduct losses incurred due to COVID-19 in 2020 from operating income earned in 2019;

[2] According to the Flash Eurobarometer survey, banks are by far the first source of finance of SMEs, followed by leasing/renting companies and private investors (depending on the countries) [ECB, 2007].

- possibility to opt out of simplified advance tax payments for "small taxpayers";
- possibility to deduct from taxable income pandemic donations made in 2020;
- exemption from income tax of support received as part of pandemic aid;
- exemption from the application of provisions increasing income providing a basis for the calculation of PIT and CIT advances by a debtor for failure to pay a liability within 90 days of the due date;
- temporary abolition of the so-called extension fee (charged on deferral of payment or arrangement to pay in instalments taxes and social security contributions, currently 4% per annum);
- postponement of the deadline for mandatory submission of new SAF-T files, including VAT return along with VAT records;
- exemption from social security contributions for specific months;
- PLN 2000 subsidy to employee wages;
- standstill benefit for self-employed individuals;
- grant of up to PLN 5000 for micro and small enterprises intended to cover the current costs of doing business according to the PKD code;
- extension of the deadline for submitting transfer pricing information;
- extension of deadlines for fulfilling obligations under the provisions on Mandatory Disclosure Rules (MDR) in relation to tax arrangements other than cross-border tax schemes [KPMG, 2020].

As part of the above-mentioned Anti-Crisis Shield, the Polish Development Fund (PFR) implemented the PFR Financial Shield for Companies and Employees. Under the Financial Shield 1.0 program, 348 thousand micro and small enterprises received aid estimated at PLN 61 billion in total. Financial Shield 2.0 benefited more than 46 thousand businesses (including 40 thousand micro-enterprises). The value of the aid granted in this case was PLN 13 billion [Alińska, 2021].

Another group of businesses that received support worth PLN 25 billion were large enterprises. The largest amount of subsidies was received by enterprises classified as restaurants and food service outlets [BOŚ Bank, 2021].

In summary, the assistance from the Polish Development Fund for Polish enterprises had the following financial dimensions:

- converted corporate bonds and loans – EUR 1.65 billion;
- preferential loans for enterprises – EUR 1.6 billion;
- preferential loans for large enterprises – EUR 2.2 billion;
- repayable advances for small and medium-sized enterprises – EUR 16.6 billion.

At this point, it is worth noting that the financial assistance obtained by enterprises was provided not only by PFR but also to other government agencies. A significant

role was played by Bank Gospodarstwa Krajowego, on whose initiative the following financial instruments were launched:

- guarantees for the amount of EUR 4.8 billion;
- grants to cover part of the financing costs of 115 EUR million;
- guarantees for both recourse factoring and reverse factoring for the amount of EUR 2.6 billion;
- interest rate subsidies for farmers in the amount EUR 9.04 million.

In addition, the Ministry of Development Funds and Regional Policy was also an important institution providing assistance to entrepreneurs. Through this ministry, Polish companies obtained:

- loans and guarantees in the amount of EUR 110 million;
- repayable advances to enterprises in the amount of EUR 700 million;
- guarantees for interest rate subsidies in the amount of EUR 0.7 billion;
- loans, sureties and guarantees for enterprises in the amount of EUR 450 million [Werner, 2021].

7.5. Leasing in business financing

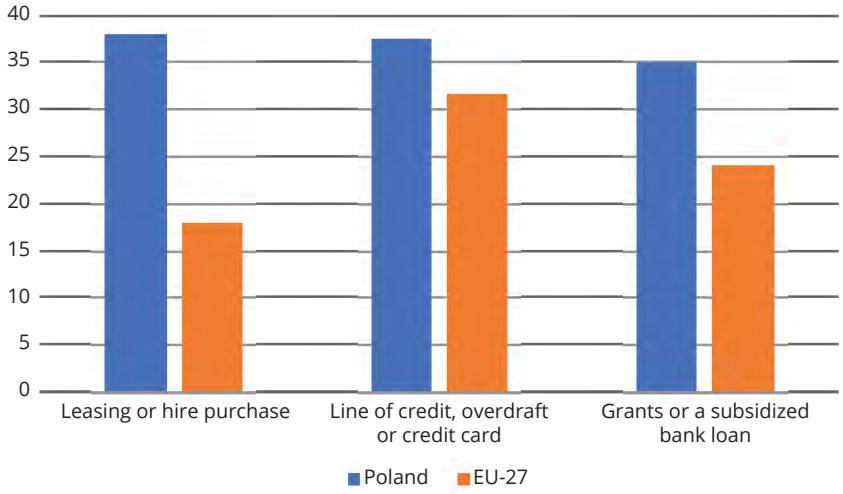
In analyzing leasing as an economic phenomenon, it can be concluded that it is a relatively new method compared to other forms of business financing. Polish law included the concept of leasing in the Civil Code, but initially it functioned as an unnamed and unregulated contract [Nesterowicz, 2020]. Bearing in mind the statistics presented above, it should be emphasized here that in addition to grants or subsidized bank loans, provided as part of the so-called COVID-19 assistance, leasing is of significant importance as a non-bank source of financing.[3] Suffice it to say that in Poland lease financing was used in 2020 by 38.7% of small and medium-sized enterprises. With this score, Poland ranks first in the EU, whereas the EU average is 19.2% (Figure 7.6).

Thus, according to the survey carried out by the European Commission in the second half of 2020 [European Commission, 2020], leasing remains the most important source of financing for Polish businesses in the SME sector. The second most frequently indicated instrument is the line of credit, with grants ranking third. The SAFE surveys carried out by the European Commission in all EU member states shows that there is a difference between Poland and other EU countries in this respect. For European SMEs in 2020, the most important sources of external financing were credit lines

[3] On the importance of leasing in Poland see ZPL [2021].

(important for 50% of companies), bank loans (important for 48% of European SMEs), and leasing (indicated by 45% of European firms).

Figure 7.6. Percentage of small and medium-sized enterprises using a chosen source of financing in Poland and the EU in 2020 (%)



Source: European Commission [2019, 2020].

Despite the significant importance of leasing in Poland, in 2020 the scale of financing provided by leasing companies decreased. The restrictions imposed by the government on retail chains had an impact on road transport – for this reason, the largest decrease in financing by leasing companies concerned the transport sector [Markowski, Tymoczko, 2021]. This affected their position as one of the sources of financing for enterprises, as the main position in the structure of lease contracts was held by leasing of road transport equipment, which accounted for 69.4% of the total value of leases. The share of passenger cars was 61.4% of the value of road transport equipment, while trucks and vans represented 16.2%. Industrial machinery and equipment were an important segment of lease financing, accounting for 25.3% of the value of new contracts. In this group, construction equipment represented 22.1% of leased funds, agricultural machinery 10.6%, and metalworking machines 9.4%. The share of computers and office equipment as well as leased real estate amounted to 1.6% and 1.2% of the total value of new lease contracts, respectively [Statistics Poland, 2021].

7.6. Bonds in business financing

The pandemic also left its mark on the corporate bond market as one of the instruments used to finance enterprises. This was reflected in the value of new corporate bond issues in 2020, which amounted to PLN 12.6 billion, the lowest in over 10 years. This was due to both the increase in uncertainty related to the spread of the COVID-19 virus and the wide range of government aid schemes. The latter effectively reduced the attractiveness of the capital market as a place to raise capital. At this point, it is worth noting that the main arrangers of bond issues in Poland in 2020, apart from financial enterprises, i.e., banks and brokerage houses, were large energy and mining companies. Debt securities issued by these companies accounted for over 35% of the value of the corporate bond market. Real estate development companies also boasted a significant share in this market, at almost 20%. Bond issues were also used by leasing and factoring companies as well as debt trading companies.

7.7. Shares in business financing

In 2020, there was a significant increase in new share issues compared to the previous year. The volume of public offerings of new stock increased from PLN 0.7 billion to PLN 3.4 billion. The aim of a vast majority of companies offering new shares of stock was to raise capital for business development. This goal was set, e.g., by the management boards of companies in the computer gaming sector (e.g., PCF Group). Other offerings were related to the need to raise additional funds for current operations (e.g., the issue of new CCC shares) or were aimed at refinancing existing debt (Allegro.eu) [KNF, 2021b].

7.8. Private equity in business financing

Among all non-bank external sources of financing for Polish enterprises, private equity funds had the smallest share in the market in question. In addition, the value of their investments decreased compared to 2019. Despite this fact, Poland was the largest private equity investment market in Central and Eastern Europe. The funds invested EUR 431 million in 105 Polish companies. This volume accounted for a quarter of the total funds that went to the region [PSIK, 2021].

7.9. Conclusions

The structure of corporate financing in Poland, due to historical past, has traditionally been dominated by banks and thus by loans. However, there have been significant changes in this area in recent years. As a result of the emergence of the pandemic, the importance of commercial financing from banks has decreased, while government aid programs have increased. This is because Polish companies, confronted with pandemic restrictions and the associated decline in revenues, were unable to guarantee regular loan repayment. Thus, they were, so to speak, "condemned" to government assistance. In this situation, the Polish government, represented in its contacts with entrepreneurs by the Polish Development Fund, bet on supporting entrepreneurship, suppressed by the spread of the COVID-19 virus. Thanks to the PFR's Anti-Crisis Shield, Polish companies, cut off from bank financing, faced the challenges associated with the time of the coronavirus pandemic.

Bibliography

Alińska, A. (2021). Publiczne pakiety stymulacyjne i działania pomocowe ograniczające skutki pandemii COVID-19 w krajach UE. In: *Finanse publiczne* (pp. 91–93), M. Zioło (Ed.). Warsaw: Polish Academy of Sciences.

Bendel, D., Demary, M., Voigtländer, M. (2016), Entwicklung der Unternehmensfinanzierung in Deutschland, *IW-Trends – Vierteljahresschrift zur empirischen Wirtschaftsforschung*, 43(1), pp. 37–54.

Boguszewski, P., Głogowski, A., Popowski, P., Postek, Ł., Puchalska, K., Sawicka, A., Tymoczko, I. (2020). *Aktywność kredytowa sektora przedsiębiorstw niefinansowych w Polsce w okresie pandemii COVID-19. Wybrane zagadnienia*. Warsaw: NBP.

BOŚ Bank (2021). *Analizy sektorowe. Raport branżowy. Działalność usługowa związana z wyżywieniem (PKD 56)*, https://www.bosbank.pl/korporacje-i-JST/serwis-ekonomiczny/analizy-sektorowe (accessed: 01.10.2022).

ECB (2007). *Corporate Finance in the Euro Area – Including Background Material*, https://www.ecb.europa.eu/pub/pdf/scpops/ecbocp63.pdf (accessed: 01.10.2022).

European Commission (2019). *Survey on the Access to Finance of Enterprises (SAFE)*, https://ec.europa.eu/docsroom/documents/38462 (accessed: 01.10.2022).

European Commission (2020). *Survey on the Access to Finance of Enterprises (SAFE)*, https://ec.europa.eu/docsroom/documents/43872 (accessed: 01.10.2022).

Frei, Ch., Lantschner, I., Völser, H. (2014). *Leitfaden Unternehmensfinanzierung*. Bozen: Handelskammer Bozen.

Grzywacz, J. (2015). Kredyt w ukształtowaniu struktury kapitałowej przedsiębiorstwa. W: *Struktura kapitału w przedsiębiorstwie w warunkach ekspansji kryzysu i zjawisk upadłościowych* (pp. 47–81), J. Grzywacz (Ed.). Warszawa: Oficyna Wydawnicza SGH.

Grzywacz, J. (2021). Źródła i struktura kapitału w przedsiębiorstwie, *Nauki Ekonomiczne*, 33, pp. 5–22.

Hüther, M., Voigtländer, M., Haas, H., Deschermeier, P. (2015). Die Bedeutung der Langfristfinanzierung durch Banken, *IW-Analysen*, 101.

KNF (2021a). *Informacja na temat sytuacji sektora bankowego w 2020 r.*, https://www.knf.gov.pl/knf/pl/komponenty/img/Informacja_na_temat_sytuacji_sektora_bankowego_w_2020_roku.pdf (accessed: 01.10.2022).

KNF (2021b). *Rynek ofert publicznych akcji w Polsce w 2020 r.*, https://www.knf.gov.pl/knf/pl/komponenty/img/Raport_oferty_publiczne_w_Polsce_w_2020_73256.pdf (accessed: 01.10.2022).

KPMG (2020). *Government and Institution Measures in Response to COVID-19*, https://home.kpmg/xx/en/home/insights/2020/04/poland-government-and-institution-measures-in-response-to-covid.html (accessed: 01.10.2022).

Markowski, K., Tymoczko, D. (2021). *Rozwój systemu finansowego w Polsce w 2020 r*. Warsaw: NBP.

NBP (2022). *Szybki Monitoring NBP*, https://www.nbp.pl/publikacje/koniunktura/raport_4_kw_2022.pdf (accessed: 17.10.2022).

Nesterowicz, R., Nesterowicz, A. (2020). Znaczenie leasingu jako źródła finansowania działalności i rozwoju przedsiębiorstw, *Przedsiębiorczość – Edukacja*, 16(2), pp. 250–260.

PFR (2020). *Tarcza Finansowa PFR 1.0*, https://pfrsa.pl/tarcza-finansowa-pfr/tarcza-finansowa-pfr10.html?_ga=2.267565006.1779654338.1621701797-636463865.1621701797&tf10=mmsp (accessed: 01.10.2022).

PSIK (2021). *Rekordowa liczba 566 spółek sfinansowana przez fundusze private equity / venture capital w Europie Środkowo-Wschodniej w 2020 roku*, https://psik.org.pl/pl/dane-i-aktualnosci/wiadomosci-psik/rekordowa-liczba-566-spolek-sfinansowana-przez-fundusze-private-equity-venture-capital-w-europie-srodkowo-wschodniej-w-2020-roku (accessed: 01.10.2022).

Statistics Poland (2021). *Działalność przedsiębiorstw leasingowych w 2020 r.*, https://stat.gov.pl/obszary-tematyczne/podmioty-gospodarcze-wyniki-finansowe/przedsiebiorstwa-finansowe/dzialalnosc-przedsiebiorstw-leasingowych-w-2020-roku,3,14.html?pdf=1 (accessed: 01.10.2022).

Werner, A. (2021). Pomoc państwa w obliczu COVID-19 na przykładzie instrumentów wykorzystywanych w Polsce, *Kwartalnik Nauk o Przedsiębiorstwie*, 22(5), pp. 71–72.

ZPL (2021). *Leasing najbardziej istotny, rośnie znaczenie dotacji*, http://leasing.org.pl/pl/aktualnosci/2021/leasing-najbardziej-istotny-rosnie-znaczenie-dotacji (accessed: 01.10.2022).

ZPP (2021). *Rozwój systemu finansowego w Polsce w 2020 r.*, https://zpp.net.pl/wp-content/uploads/2021/01/25.01.2021-Business-Paper-Podsumowanie-lockdownu-w-Polsce.pdf (accessed: 01.10.2022).

Chapter 8

Labor Availability and Skills in Poland

Anna Maria Dzienis

8.1. Introduction

There are several pressures that have an impact on the future development of the Polish labor market. These include the consequences of the COVID-19 pandemic which stressed the necessity for accelerating digital transformation, the war in Ukraine and the wave of immigrants, mostly women, the issues of generational change, an aging society, and skill shortages. All these challenges need to be reasonably managed to mitigate negative impacts while taking advantage of positive developments.

Meanwhile, during the past years, Poland has experienced serious declines in global competitiveness rankings performed annually by the Institute for Management and Development (IMD). According to the IMD World Competitiveness Ranking, in 2022 Poland was ranked 50 among 63 countries in overall competitiveness, 3 ranks down from 2021 and 16 ranks down compared to 2018. The index consists of four factors of competitiveness: economic performance in which Poland scored 29 (18 in 2018, 27 in 2021), government efficiency – 56 (40 in 2018, 56 in 2021), business efficiency – 58 (37 in 2018 and 57 in 2021) and infrastructure – 43 (34 in 2018, 42 in 2021). The following sub-factors of business efficiency recorded the lowest ranks: management practices (62), attitudes and values (61), and labor market (59). Weaknesses are seen, among others, in the credibility of managers, social responsibility, attracting and retaining talent, and apprenticeships [IMD, 2022a]. Moreover, 2022 IMD World Digital Competitiveness Ranking rated Poland 46 out of 63 surveyed economies (36 in 2018 and 41 in 2021). The index contains three factors knowledge (42), technology (46) and future readiness (43), which all declined compared to the year before. The worst performing sub-factors were employee training (61), use of big data and analytics (61) and agility of companies (59) [IMD, 2022b].

These results not only point to a growing problem of managers' dissatisfaction with the available human resources but also bring to daylight the lack of change in managerial practices themselves, in both business and public sectors. This chapter aims to review the situation in the Polish labor market during the past few years and identify its key

challenges from the perspective of entrepreneurial management, which seems to be tailored to the needs of the fast-changing environment. The author suggests that efficient cooperation between private and public sectors could accelerate the change and foster working out flexible and innovative approaches to the management of the pool of labor in Poland.

8.2. Literature review

This section synthesizes the perspective of entrepreneurial management drawing on a few yet prominent scholars. The key motive here is to see a manager as an innovator and managerial practices as a tool for enforcing change in existing systems.

The economist who was truly concerned about the significance of entrepreneur and entrepreneurship in the economy was Joseph A. Schumpeter. Schumpeter [1934] introduced a new definition of entrepreneurship, in which he recognizes innovation such as new products, new production methods, new markets, and new forms of organization, as the driving force of economic development. Accordingly, Schumpeter [1934] sees an entrepreneur as an individual who carries out new combinations of means of production. Such an individual can be named a leader and his revolutionary ways of management can be named the entrepreneurial kind of leadership, as he "leads" the means of production into new channels "by buying them or their services and then using them as he sees fit" [Schumpeter, 1934, p. 89]. His leadership is also reflected in the presence of people, other producers in his branch, who follow his actions. Furthermore, Schumpeter stresses that an entrepreneur "relies less (…) on the tradition and connection and because his characteristic task (…) consists precisely in breaking up old, and creating new, tradition" [1934, s. 92] he is an agent of change.

Another outstanding scholar in management theory and practice, Peter F. Drucker, states that "(t)he 'new technology' is entrepreneurial management" [Drucker, 1985, p. 11], which highlights the significance of human attitude towards an organization, characterized by independence in solving new, unprecedented problems by applying creative solutions, and flexibility in adapting to constantly changing environment. Drucker suggests that in times of such rapid change and innovation, acquiring entrepreneurial competence in business is a matter of life and death [1985, p. 144]. He then points out that "it is the existing business (…) that has the best capability for entrepreneurial leadership. It has the necessary resources, especially the human resources," it has already acquired managerial competence and established a management team so "it has both the opportunity and the responsibility for effective entrepreneurial management" [Drucker, 1985, p. 144]. These statements clearly stimulate

to take innovative actions within an organization to maximize its human resources. "Entrepreneurial management must make each manager of the existing business *rerum novarum cupidus*" [Drucker, 1985, p. 151], greedy for new things.

From a behavioral perspective, Gartner says that "entrepreneurship is a role that individuals undertake to create organizations" [1989, p. 64], which refers to new venture creation but could also apply to an organization's re-creation, reorganization. Wach [2015] analyzes entrepreneurship in four basic dimensions, the second of which is studying entrepreneurship as a function of managerial practices. Within this perspective, he sees two main strands of research: entrepreneurship as a process of creating new ventures, and entrepreneurship as a process of discovering and seizing opportunities [Wach, 2015, p. 27].

This brief literature review on entrepreneurial attitude in management illustrates a manager-innovator as:

a) an agent of change;
b) an individual greedy for new things;
c) a creator of an organization, a leader of a process of reorganization;
d) an individual who leads the means of production into new channels;
e) an individual who discovers, seizes, and takes advantage of opportunities;
f) an example for others to follow.

8.3. The overall performance of labor market in Poland

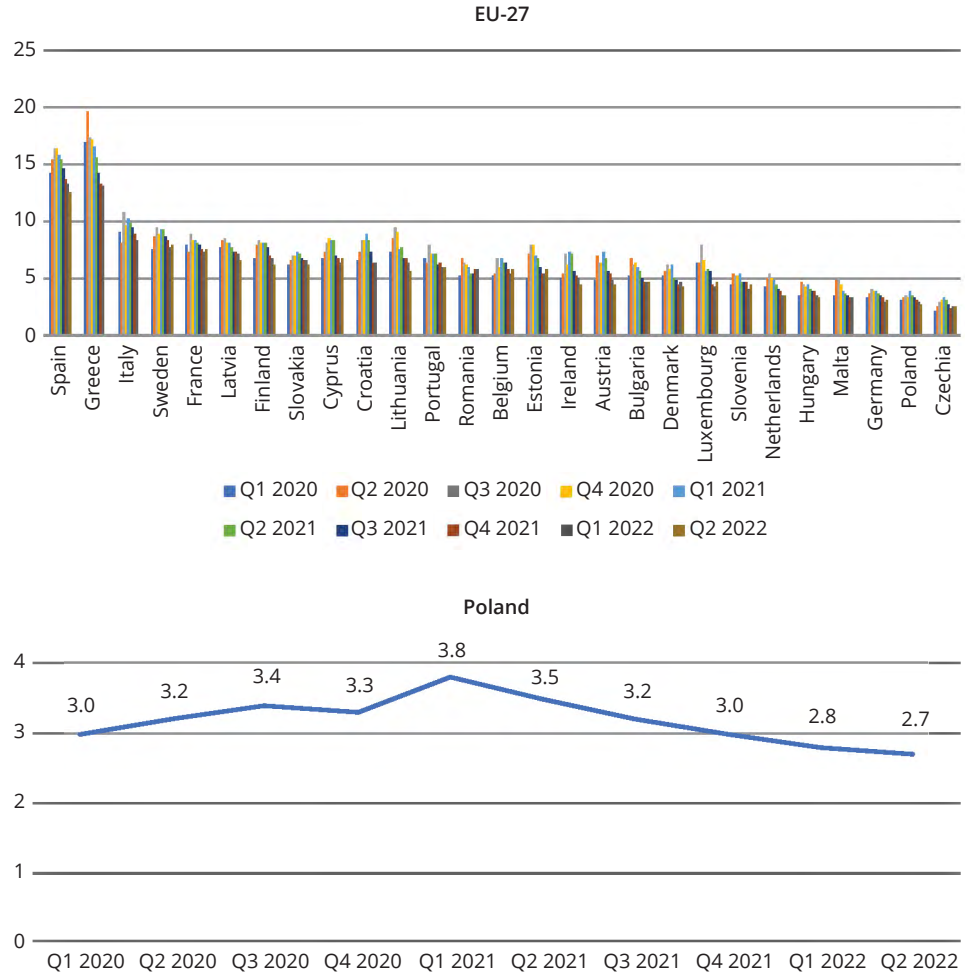
This section outlines the performance of the key labor market indicators such as unemployment, employment, labor market transition, job creation and labor availability. The analysis aims to highlight major challenges in terms of the future development of the market.

8.3.1. Unemployment

According to the Eurostat Labor Force Survey (LFS), the total unemployment rate in Poland went up from 3.2% in 2020 to 3.4% in 2021 (with the total registered unemployment rate calculated by Statistics Poland at 5.4%). In Q2 2022, the unemployment rate (measured by Eurostat) reached 2.7% (4.9% in terms of registered unemployment data from Statistics Poland), down by 0.8 p.p. compared to Q2 2021. In Q2 2022, the unemployment rate for females was higher than for males (3.1% and 2.3%, respectively), similarly to the previous quarters. The unemployment rate reached a three-year peak in Q1 2021 (Figure 8.1), 3.8% for males and 3.7% for

females. However, according to the monthly data from Statistics Poland Local Data Bank (LDB), from the beginning of 2022 until September 2022 no significant changes in the inflow into the unemployment rate were observed [Statistics Poland, 2022d].

Figure 8.1. Unemployment rate – share of population aged 15–74 years in the labor force (%)*



* Quarterly seasonally adjusted data.

Source: compiled by author based on Eurostat [2022b].

At the end of Q2 2022, the share of women accounted for approx. 55% of the total number of unemployed, showing a rise of 1.0 p.p. with regard to the same period of the previous year. At the same time, people aged 35–44 constituted the largest group in the total number of unemployed, 26.4%. People aged 25–34 accounted for 25.5%, the

group of people 45–54 years reached the share of 20%, and those aged over 55 almost 18%. The unemployed women with secondary and tertiary education constituted 58% of the total number of unemployed [Statistics Poland, 2022a, p. 11].

8.3.2. Employment

The number of employed persons in the national economy (end of period) increased in Q2 2022 by 151.5 thousand people compared to the same period of the previous year. The growth of employment reached 2% y/y for both Q1 and Q2 2022 and even outperformed the level of employment in Q1 and Q2 2019 (increasing by 1.3% and 1.2% respectively). Even though the number of employed people increased in Q2 2022 compared to Q2 2021, employment in several industries continued to shrink. The highest decreases could be seen for people employed in electricity, gas, steam and air conditioning supply – 2.1%, and for those employed in mining and quarrying, and in real estate activities, at 1.8% and 1.5% respectively. On the other hand, employment in information and communication increased by 11% (compared to an increase of 5% y/y in Q2 2021). Transportation and storage continued to grow, by 1.4% in Q2 2021, and 2.6% in Q2 2022 [Statistics Poland, 2022c].

8.3.3. Labor market transition

As for the Eurostat's data on labor market flows, out of all unemployed persons in Poland in Q4 2021, almost 54% (51% in the EU) remained unemployed, 19% (25% in the EU) moved to employment and 27% (24% in the EU) moved to the status of inactivity, in Q1 2022 (Table 8.1).

Table 8.1. Transition in labor market status in Poland and EU-27 between Q4 2021 and Q1 2022 (% of initial status)*

	Employment	Unemployment	Inactivity
Poland	98.5	0.5	1.0
	19.2	54.1	26.7
	1.8	1.4	96.7
EU-27	96.5	1.2	2.4
	25.2	51.3	23.6
	4.5	3.2	92.2

* Seasonally adjusted data, not calendar-aligned.

Source: compiled by author based on Eurostat [2022a].

As indicated in the author's previous studies [Dzienis, 2019; Dzienis, 2022], Polish people, compared to the EU-27 population, continue to change their status from unemployed to employed less frequently. At the same time, there exists a higher probability for them to change their status from unemployed to inactivity, and in the inactivity group, there is a visibly lower inter-status mobility.

8.3.4. Job creation

Job creation is associated with business growth, which can be linked to trends in new firm creation and value-added growth. The change in gross value added by selected sectors reinforces the position of three sectors: industry, manufacturing, and transportation and storage (Table 8.2).

Table 8.2. Change in gross value added in selected sectors in 2021 related to 2020

Sectors	2021/2020
Industry*	22.0
Manufacturing	20.1
Transportation and storage	13.8
Real estate activities	11.3
Trade; repair of motor vehicles	10.9
Financial and insurance activities	7.8
Professional, scientific and technical activities	7.7
Administrative and support service activities	7.0
Education	5.8
Public administration and defence; compulsory social security	5.7
Human health and social work activities	5.6
Agriculture, forestry and fishing	5.5
Construction	3.7
Arts, entertainment and recreation	2.3
Information and communication	−0.9
Other service activities	−15.7
Accommodation and catering	−16.7
Activities of households as employers and product-producing activities of households for personal use	−17.9

* Includes: mining and quarrying, manufacturing, water supply, sewerage, waste management and remediation activities (31.9); electricity, gas, steam and air conditioning supply (3.4); mining and quarrying (−6.3).

Source: compiled by author based on Statistics Poland [2022c].

In terms of newly registered companies in the National Court Register (KRS), the most frequently registered NACE sectors in the first half of 2022 were as follows [COIG, 2022]:

1) wholesale and retail trade; repair of motor vehicles (16% of the total number of new companies registered in the first half of 2022);
2) professional, scientific and technical activities (15%);
3) construction (15%);
4) information and communication (8%).

Within these sectors, the most commonly declared divisions were: the development of building projects, business and other management consultancy, freight transport by road, computer programming activities, and construction of residential and non-residential buildings.

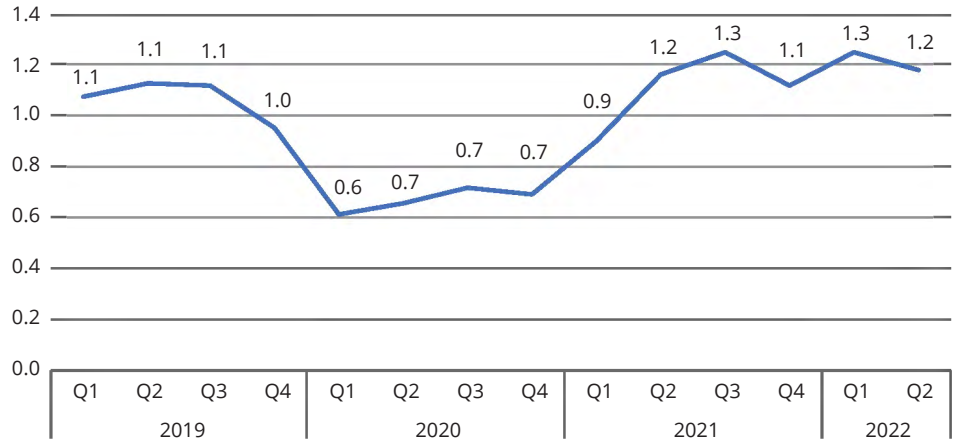
Among the 10 agglomerations in Poland analyzed by Grant Thornton [PARP, 2022] the highest number of new job offers was published by companies in Warsaw (41.9 thousand, an increase by 15% y/y) and Kraków (20.7 thousand, an increase by 12% y/y), and the least in Poznań (3.6 thousand, an increase by 16% y/y). The highest annual increase in job offers was recorded in the financial sector and IT, while the biggest decrease occurred in demand for blue-collar workers. The highest increase in offers was recorded for the positions of CIO/IT director, cybersecurity specialist, marketing/sales director. In the second half of 2022 employers most often plan to recruit specialists in the field of IT (39%), sales (29%) and production (28%). Finally 82% of companies expect difficulties in recruitment, 8 p.p. more than half a year earlier [PARP, 2022].

8.3.5. Job vacancy rate

At the end of the first half of 2022, job vacancies increased by 4.5% (149.3 thousand) compared to the corresponding period of the previous year. In Q2 2022, there were 2.1 jobs created per job eliminated, but during the year the dynamics of jobs created decreased by almost 7%, while that of eliminated jobs increased by approx. 13% [Statistics Poland, 2022b].

At the end of June 2022, there were more occupied and vacant jobs than in the same period of the previous year (Q2 2021). Looking at the second quarters solely, the job vacancy rate was the highest since 2018 (Figure 8.2) although in Q2 2022 the number of newly created jobs decreased y/y and the number of eliminated jobs increased [Statistics Poland, 2022b]. The highest job vacancy rates, all higher than 1, were recorded among craft and related trades workers, plant and machine operators and assemblers, and professionals (Table 8.3).

Figure 8.2. Job vacancy rate in Poland between Q1 2019 and Q2 2022 (%)



Source: compiled by author based on Statistics Poland [2022b].

Table 8.3. Jobs in selected major occupational groups in the Q2 2022 (%)*

Major occupational groups	Share of total occupied jobs	Share of total job vacancies	Job vacancy rate
Professionals	22.9	24.9	1.3
Technicians and associate professionals	9.3	7.8	1.0
Clerical support workers	12.6	9.6	0.9
Services and sales workers	11.5	8.9	0.9
Craft and related trades workers	14.5	23.0	1.86
Plant and machine operators and assemblers	12.4	15.4	1.47
Elementary occupations	8.3	6.3	0.89

* As at the end of the quarter.

Source: Statistics Poland [2022b].

8.3.6. Deficit occupations

According to the seventh edition of annual report Barometr Zawodów 2022, in 2021 there were thirty deficit occupations, while 138 were in balance [WUP Kraków, 2021, p. 18]. Difficulties in filling the jobs are expected to be especially pronounced in construction, medical and manufacturing industries. Interestingly, in 2021 for the first time since the first issue of the report, none of the surveyed occupations was assessed as a "surplus" occupation. Further, it is predicted that due to the higher employees expectations, the mobility of workers would increase [WUP Kraków, 2021].

As the results of the market survey by Grant Thorton [PARP, 2022] show, the highest number of job vacancies was observed for the positions of a driver, cashier, and shop assistant. The highly specialized professions were dominated by the demand for accountants and programmers. Labor shortages were also visible in education and care, in particular in case of teachers, caretakers, tutors in nurseries and kindergartens, and carers of elderly and sick people [PARP, 2022].

8.4. Labor immigrants in Poland

As reported by the Ministry of Family and Social Policy (MRiPS) during the past few years, Poland has been a European leader in terms of the incoming labor migration [MRiPS, 2021, p. 3]. Nevertheless, the economic crisis triggered by the COVID-19 pandemic slowed down the pace of economic growth significantly, resulting in a decline in Poland's gross domestic product in 2020. These together with repeatedly imposed lockdowns resulted in a lower number of registered work permits for foreigners and employers' declarations on entrusting work to a foreigner. The Ministry's calculations show, however, a return to an upward trend after the economic and social damage inflicted by the pandemic. Despite the fact that in terms of the semi-annual data between 2015 and 2019 the growth dynamics decreased, the nominal number of work permits issued to foreigners in mid-2021 was the highest compared to the previous years [MRiPS, 2021, pp. 3, 5].

In 2020, 406 thousand foreigners applied for a work permit in Poland, which constitutes a 518% increase in the number of applications that were registered in 2015, and 24% more than in 2018. Over 72% of all applications were filed by citizens of Ukraine (295 thousand, a 24% increase compared to 2018), 7% by Belarusians (27 thousand, 42% increase) 2% by Georgians (8 thousand, 198% increase) and 2% by Indians (8 thousand, 2% decrease compared to a record high 2018). Among the top ten nationalities, the highest growth was recorded for Indonesians 1003% (almost 4 thousand permits) and Filipinos 259% (7 thousand; Table 8.4). The strongest growth outside the group of leaders occurred for Turkmenistan, Nigeria and Cameroon [Statistics Poland, 2021]. Until July 2021 the majority of work permits for foreigners were issued in the following Polish Classification of Activities (PKD) sections: administrative and support service activities (mostly for temporary employment agencies), manufacturing, construction, transportation and storage [MRiPS, 2021, p. 910].

The share of foreigners who received work permit in 2020 by voivodeships was as follows, 17% in Mazowiecke, 12% in Wielkopolskie, and 10% for Łódzkie and Małopolskie [Statistics Poland, 2021]. The Ministry points out that the coefficient of

variation, defined as the ratio of the standard deviation to the voivodeship average of the number of work permits issued for foreigners, proves growing homogeneity in voivodeships [MRiPS, 2021, p. 7].

Table 8.4. Number of foreigners who received work permits in Poland by nationality in 2015–2020

		2015	2016	2017	2018	2019	2020
1	Ukraine	50 465	106 223	192 547	238 334	330 495	295 272
2	Belarus	2037	4870	10 518	19 233	27 130	27 304
3	Georgia	88	142	398	2752	7438	8213
4	India	1425	1772	3938	8362	8063	8184
5	Moldova	1488	2844	3792	6035	8341	7616
6	Philippines	179	249	733	2057	6317	7391
7	Uzbekistan	1433	836	1409	2634	6309	5873
8	Nepal	596	1211	7075	19 912	9175	5708
9	Indonesia	75	111	148	352	2023	3885
10	Bangladesh	319	721	2412	8341	6986	3758

Source: Statistics Poland [2021].

After the first months of the war in Ukraine, at the turn of April and May 2022, the most numerous group among the Ukrainian refugees were people aged 30–44 (41%), mainly women (almost 90%), mostly with children (57%). The share of the elderly (60+) accounted for 25%. In terms of employment, 19% of Ukrainian women had already started a job, and 37% had it promised or were looking for a full-time job. Furthermore, 50% of refugees have higher education, 35% secondary, and 15% elementary. The most interested in staying in Poland were men (23%) and young people up to 29 years of age (22%) [NBP, 2022].

8.5. Conclusions

Poland faces poor performance in competitiveness and digital rankings, especially in the area of business efficiency. The worst-performing sub-factors in this block of the IMD survey are management practices, attitudes and values, and the labor market. These facts seem to be in contrast with the overall situation in the Polish labor market.

In the past few years, the unemployment rate has continued to historically low levels. While the COVID-19 pandemic triggered a substantial slowdown across the EU economies, employment figures in Poland proved to be strong. Furthermore, as

the nationwide research by the Voivodeship Labor Office in Krakow reveals, Polish employers plan to hire more workers in 2022 than dismiss [WUP Kraków, p. 16]. Consequently, the situation in the labor market has been tightening. Even though the inflow of foreign labor migrants has been increasing, resulting in a mid-2021 semi-annual record in the number of work permits and declarations on entrusting work to a foreigner issued mostly for entities in the fastest-growing sectors, the job vacancy rate at the end of the first half of 2022 was the highest since 2018.

This evidence suggests that Poland needs a profound structural change in the field of human resources management, in both private and public sectors. The country needs innovative approaches to dealing with challenges such as the high shares of women with secondary and tertiary education and young people in the total number of unemployed people, and the relatively low inter-status mobility of people belonging to the unemployment and inactivity groups. A starting point for companies could be promoting a more flexible and inclusive organizational culture, which tracks gender and age balance, and flexes career paths and mindsets [Wittenberg-Cox, 2020]. Changing behaviors and mindsets, together with organizational practices and company values is an essential element of an effective cultural transformation [WEF, 2021]. Employees confirm that they wish to work with supportive managers (74%) and trusted leaders (71%) who provide greater flexibility, autonomy, coaching, and development [PARP, 2022]. As firms know best the needs of the market, they can react faster than, e.g., the education sector, to skills deficiencies and changing preferences for work. This is an opportunity for companies to implement internal upskilling and reskilling training according to their skill demand, and adjust part-time job offers and prospects for hybrid and remote modes of work, to those willing to work.

Institutional support such as public-private cooperation to address skills shortages and comprehensive immigration policy that takes into account the domestic need for workers, accompanied by the promotion of innovation and productivity growth through digital technologies, would definitely foster the development of entrepreneurial management practices towards new challenges.

Bibliography

COIG (2022). *Nowe firmy w KRS 2022*, https://www.coig.com.pl/2022-nowe-firmy-w-krs.php (accessed: 19.10.2022).

Drucker, P.F. (1985). *Innovation and Entrepreneurship. Practice and Principles*. New York: Harper Collins.

Dzienis, A.M. (2019). Availability of Suitable Labour Supply and Skills. In: *A Study on Structural Reform in Poland, 2013–2018* (pp. 65–140), M.A. Weresa (Ed.). Brussels: European Commission.

Dzienis, A.M. (2022) Labour and Skills Availability in the Times of the COVID-19 Pandemic. In: *Poland: Competitiveness Report 2022. Towards a Sustainable Economy in a Pandemic Era* (pp. 67–82), M.A. Weresa, A.M. Kowalski (Eds.). Warsaw: SGH Publishing House.

Eurostat (2022a). *Labour Market Transitions – Quarterly Data*, https://ec.europa.eu/eurostat/databrowser/view/LFSI_LONG_Q__custom_3432305/default/table?lang=en (accessed: 19.10.2022).

Eurostat (2022b). *Unemployment by Sex and Age – Quarterly Data*, https://ec.europa.eu/eurostat/databrowser/view/UNE_RT_Q/default/table?lang=en (accessed: 26.09.2022).

Gartner, W.B. (1989). "Who Is an Entrepreneur?" Is the Wrong Question, *Entrepreneurship Theory and Practice*, 13(4), pp. 47–68.

IMD (2022a). *World Competitiveness Ranking 2022*, https://www.imd.org/centers/world-competitiveness-center/rankings/world-competitiveness/ (accessed: 30.09.2022).

IMD (2022b). *Digital Competitiveness Ranking 2022*, https://www.imd.org/centers/world-competitiveness-center/rankings/world-digital-competitiveness/ (accessed: 30.09.2022).

MRiPS (2021). *Informacja o zatrudnieniu cudzoziemców w Polsce (stan na 1 lipca 2021 r.)*, https://tiny.pl/9vh5 r (accessed: 20.10.2022).

NBP (2022). *Sytuacja życiowa i ekonomiczna uchodźców z Ukrainy w Polsce*. Warsaw.

PARP (2022). *Rynek pracy, edukacja, kompetencje. Aktualne trendy i wyniki badań (sierpień 2022)*. Warszawa.

Schumpeter, J.A. (1934). *The Theory of Economic Development. An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle*. Cambridge: Harvard University Press.

Statistics Poland (2021). *Demographic Yearbook of Poland*, https://stat.gov.pl/obszary-tematyczne/roczniki-statystyczne/roczniki-statystyczne/rocznik-demograficzny-2021,3,15.html (accessed: 25.10.2022).

Statistics Poland (2022a). *Bezrobocie rejestrowane: 1–2 kwartał 2022 roku*, https://stat.gov.pl/obszary-tematyczne/rynek-pracy/bezrobocie-rejestrowane/bezrobocie-rejestrowane--2-kwartal-2022-roku,3,51.html (accessed: 20.10.2022).

Statistics Poland (2022b). *The Demand for Labour in the Second Quarter of 2022*, https://stat.gov.pl/en/topics/labour-market/demand-for-labor/the-demand-for-labour-in-the-second-quarter-of-2022,2,46.html (accessed: 20.10.2022).

Statistics Poland (2022c). *Wskaźniki makroekonomiczne*, https://stat.gov.pl/wskazniki-makroekonomiczne/ (accessed: 20.10.2022).

Statistics Poland (2022d). *Local Data Bank: Labour Market*, https://bdl.stat.gov.pl/bdl/dane/podgrup/tablica (accessed: 26.09.2022).

Wach, K. (2015). Przedsiębiorczość jako czynnik rozwoju społeczno-gospodarczego: przegląd literatury, *Przedsiębiorczość – Edukacja*, 11, pp. 23–36.

WEF (2021). *Digital Culture: The Driving Force of Digital Transformation*, https://www.weforum.org/reports/digital-culture-the-driving-force-of-digital-transformation (accessed: 30.10.2022).

Wittenberg-Cox, A. (2020). *How Companies Can Meet the Needs of a Changing Workforce*, https://hbr.org/2020/12/how-companies-can-meet-the-needs-of-a-changing-workforce (accessed: 30.10.2022).

WUP Kraków (2021). *Barometr Zawodów 2022. Raport podsumowujący badanie w Polsce*, https://barometrzawodow.pl/modul/publikacje?publication=national&year=2022 (accessed: 20.10.2022).

Chapter 9

Innovative Capacity, Digital Transformation, Technological Entrepreneurship, and Clusters

Arkadiusz Michał Kowalski, Małgorzata Stefania Lewandowska, Marzenna Anna Weresa

9.1. Introduction

The objectives of this chapter are to:

1) identify the strengths and weaknesses of the Polish innovation system, taking into account the state of preparedness of enterprises in Poland for digital transformation;
2) characterize technological entrepreneurship in Poland;
3) define the role of clusters in fostering the innovative capacity of enterprises.

These objectives correspond with the structure of the chapter, in which three parts are distinguished corresponding to the macro- (innovative capacity of the economy) and microeconomic (technological entrepreneurship) perspectives, complemented by a mesoeconomic perspective referring to clusters as a factor of innovative activity of enterprises. The whole discussion is wrapped up with a summary in which conclusions arising from the analyses are posited.

9.2. Innovation performance of the Polish economy and digital transformation

Are Poles an innovative nation? How does Poland perform in terms of innovation vis-à-vis the European Union? What is Poland's innovation performance in digital technologies? Answers to these questions can be provided by a comparative analysis of national innovative capacity defined in the scientific literature as the ability of a country to constantly produce and commercialize new, previously unknown solutions [Furman, Porter, Stern, 2002]. Using this definition as a base, the innovation performance of an economy is the outcome of various interrelated elements such as: tangible and intangible resources, expenditures necessary for the efficient use of

these resources and improvement of their quality, and government innovation policy defining priority areas of science and technology development and shaping the scope of financing research and development (R&D) activities from public sources [Weresa, 2022]. Comparing Poland's innovation performance with other countries boils down in this approach to identifying, by means of a set of metrics, the factors describing the resources for innovation, the outputs of innovation activities, and the links within the innovation system that are crucial for the diffusion of innovation. Using research on the innovation performance of EU countries, the results of which are published as part of the annual European Innovation Scoreboard [EC, 2022a], 18 innovation indicators were selected for comparative analysis, describing the three dimensions mentioned above, i.e., resources (5 indicators), outputs (8 indicators), linkages in the innovation system (5 indicators). A synthetic picture of the innovation performance of the Polish economy compared to EU average is shown in Figure 9.1.

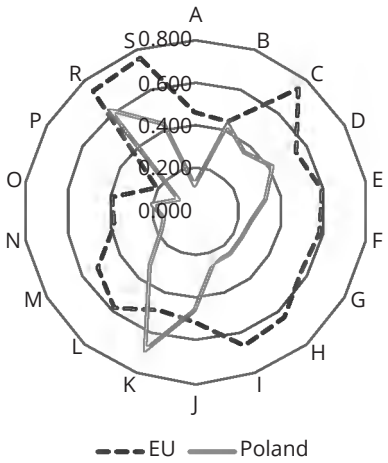
The comparison of the position of Poland in terms of scientific and research staff and the level of education of the society with the average for EU countries shows that the greatest asset of the Polish economy in this area is the education of its population – the share of population aged 30–34 having completed tertiary education was 40.6% in 2021, i.e., 96% of the EU average. However, despite the rapid development of private universities in Poland over the last two decades, the share of the population with tertiary education decreased by 3 p.p. compared to 2015 [EC, 2022a].

Insufficient financial resources are one of the barriers to the development of the R&D sector in Poland [Weresa, 2022]. This applies to both public and private sector expenditure in relation to GDP and insufficient financial resources available to enterprises through venture capital funds. However, it is worth emphasizing the significant increase in the share of R&D expenditure of the enterprise sector between 2015 and 2021 (from 0.47% of GDP in 2015 to 0.88% of GDP), but in 2021 it was still only 56% of the EU average. Public sector expenditure on R&D and the value of venture capital funds in relation to GDP did not change significantly, while expenditure of enterprises on innovation activities decreased [EC, 2022a, p. 68]. This negative trend may have long-term effects of reducing the stream of innovation in the coming years. The gap in this area separating Poland from the EU average is very large, which is confirmed by data on sales of new-to-market and new-to-enterprise products as percentage of turnover. The indicator for Poland is a mere 54% of the EU average, and over the period 2015–2021 it increased by only 9.2 p.p. [EC, 2022a, p. 68].

Among other metrics of innovation viewed in terms of effects, it is worth noting intellectual property creation, measured by patents, trademarks, or industrial designs. Poland stands out in the EU for industrial design applications relative to GDP, with a score of 141% of the EU average and this advantage remained at a similar level

in the period 2015–2021. However, there is still a patent gap between Poland and the EU average, both in terms of the total number of patent applications and the share of patents on environment-related technologies. For both indicators, Poland achieves just over one-third of the EU average. In addition, there is a decrease in the share of environment-related technologies in the total number of patents [EC, 2022a, p. 68], which may make it difficult for Poland to achieve sustainable competitiveness.

Figure 9.1. Innovation performance: Poland vis-à-vis the EU average in 2021*



* Values normalized for 2021 or the last year for which data was available.

Legend:

1) resources for innovation:

A – new doctorate graduates in science, technology, engineering and mathematics (STEM) per 1000 population aged 25–34;
B – percentage population aged 25–34 having completed tertiary education;
C – venture capital expenditures as percentage of GDP;
D – direct government funding and government tax support for business R&D as percentage of GDP;
E – R&D expenditure in the business sector as percentage of GDP;

2) outputs od innovation activities:

F – scientific publications among the top-10% most cited publications worldwide as percentage of total scientific publications of the country;
G – SMEs introducing product innovations as percentage of SMEs;
H – SMEs introducing business process innovations as percentage of SMEs;
I – PCT patent applications per 1 billion GDP in PPP;
J – trademark applications per 1 billion GDP in PPP;
K – design applications per 1 billion GDP in PPP;
L – sales of new-to-market and new-to-enterprise innovations as percentage of turnover;
M – environment-related technology patents as percentage of all patents;

3) linkages in the innovation system:

N – international scientific co-publications per 1 million population;
O – innovative SMEs co-operating with others as percentage of all SMEs;
P – public-private scientific co-publications per 1 million population;
R – exports of medium and high technology products as a share of total product export;
S – knowledge-intensive services exports as percentage of total services exports.

Source: compiled by authors based on the methodologies and data from EC [2022a, 2022b].

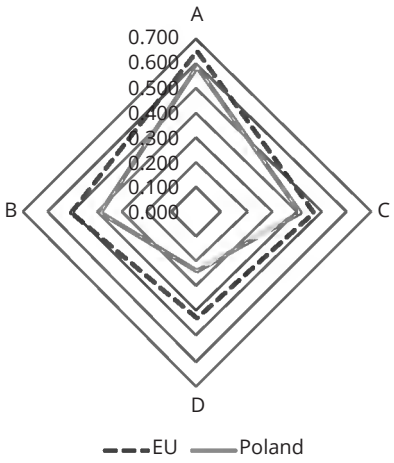
The analysis of the outputs of innovation activity in terms of the linkages between the innovation system (in the country and with regard to co-operation with other countries) identifies one area in which the distance to the EU average is the smallest. It is the share of medium and high-tech product exports in total exports of goods (indicator *R* in Figure 9.1), but the score decreased slightly (by 0.4 p.p.) in the period 2015–2021). Other indicators describing the linkages in the innovation system are at about half of the average values of the relevant indicators in the EU, yet it is worth noting their increase in relation to the EU average by about one-third between 2015 and 2021 [EC, 2022a, p. 68].

The analysis of three groups of innovation indicators for the Polish economy (resources for innovation, outputs, linkages in the innovation system) can be summarized by a comparison of the Summary Innovation Index and its changes since 2015. Poland, as well as Hungary, Slovakia, Croatia, Latvia, Bulgaria, and Romania, belongs to the group of so-called emerging innovators, and the Summary Innovation Index for Poland in 2022 was 60.5% of the EU average. The innovation index increased gradually (by 11.3 p.p. from since 2015) at a slightly higher rate than the EU average (9.9 p.p.). It seems that digital transformation of enterprises, which is important for market expansion and stimulating the innovative capacity of enterprises, may be an opportunity to improve the innovation performance of the Polish economy [Fachrunnisa, Adhiatma, Lukman, Majid, 2020; Oswald, Kleinemeier, 2017; Kostrzewski, Marczewska, Chamier-Gliszczynski, Woźniak, 2020]. Digital transformation is seen as a multidimensional concept that combines technological and economic factors, both at the macro and micro levels [Kraft, Lindeque, Peter, 2022]. A critical analysis of the literature on digital transformation shows that technological, socio-economic and environmental aspects must be integrated in order to describe this process in a comprehensive way [Marczewska, Weresa, 2023].

There are many approaches to assessing the state of digitalization in different countries. Areas that are analyzed in terms of the advancement of digitalization include innovation and transformational technologies, education and training, trade, financial flows, etc. Core indicators describing different aspects of digitalization are given in absolute values and are further used to calculate composite indicators. New approaches to the design of composite indicators allow the advancement of digitization to be measured at various levels. The national level is described using the Digital Economy and Society Index (DESI) [EC, 2022c] and the Digital Intelligence Index (DII) [Chakravorti, Chaturvedi, Filipovic, Brewer, 2020]. Attempts are also made to measure the digitalization of sectors using the Digital Intensity of Sector indicator [Calvino, Criscuolo, Marcolin, Squicciarini, 2018; OECD, 2019] or the Network Readiness Index (NRI) [Dutta, Lanvin, 2020]. Sidorov and Senchenko [2020] compared

the digitalization of regions. All these approaches cover a whole range of different indicators. Their comparative analysis goes beyond the scope of this study, which aims to focus on selected aspects of this phenomenon, namely the state of preparedness of Polish enterprises for digital transformation. Therefore, the analysis performed in this chapter includes basic indicators determining the key resources necessary for the digital transformation of Polish enterprises. Comparing them to the EU average, a synthetic picture of the digital transformation capability of Polish enterprises can be obtained (Figure 9.2).

Figure 9.2. Resources for digital transformation of enterprises: Poland vis-à-vis the EU average as of 2021*



* Values normalized for 2021 or the last your for which data was available.

Legend:
A – enterprises with a maximum contracted download speed of the fastest fixed internet connection of at least 100 Mb/s as percentage of all enterprises;
B – enterprises providing training to develop or upgrade ICT skills of their personnel as percentage of all enterprises;
C – employed ICT specialists as a percentage of total employment;
D – individuals who have above basic overall digital skills (a compound indicator of internet activity of individuals aged 16–74).

Source: compiled by authors based on the methodologies and data from EC [2022a, 2022b].

Poland deviates from the EU average in all four analyzed aspects of digital transformation capability. Polish enterprises are lagging behind the least in terms of access to high-speed internet (indicator A in Figure 9.2; 89.7% of the EU average), while the largest gap is revealed in the digital skills of society (indicator D – Figure 9.2; 77.3% of the EU average). Training activities to develop the digital skills of employees are carried out at company level, but this indicator for Poland is lower than the EU average – in 2021 it was 87.5% of the EU average, with an increase of 50 p.p. over the period 2015–2022 (and by as much as 31.3 p.p. since 2021). However, there is

no change in the share of people with at least basic digital skills in the population aged 16–74. This rate has remained at 77% of the EU average for many years and has not improved since 2015.

These results show that the most important area that requires innovation policy interventions necessary to advance the digital transformation of enterprises is investment in increasing the digital competences of society, so as to expedite the digital transformation of enterprises also by strengthening the demand for digitally advanced products and services. Technological competences (including digital) and digital transformation are important determinants for the development of technological entrepreneurship, which is discussed in more detail in the next sub-chapter (cf. Figure 9.3).

9.3. Technological entrepreneurship and its key determinants

Entrepreneurship is the creative and active improvement of the existing state of affairs and readiness to undertake new activities. According to Schumpeter [1976], the essence of entrepreneurship is the ability to break away from routine, to destroy existing structures. Entrepreneurship can be perceived from the perspective of an individual – an entrepreneur as a person capable of creative action, building a business, selecting the right people to work with, as well as acquiring and properly allocating resources and taking personal risks. As new technologies have been an extremely important source of competitive advantage and value creation in recent decades, technological entrepreneurship (technology-related entrepreneurship) has attracted the attention of researchers and business practitioners.

Early definitions described technological entrepreneurship as a process related to an entrepreneur or firm. According to Jones-Evans [1995], technological entrepreneurship is the creation of new technological solutions. Dorf and Byers [2005] define technology entrepreneurship as a style of business leadership where the entrepreneur is able to identify opportunities that require the application of intensive technology, the accumulation of resources (including talent and capital), and management through the ability to make decisions quickly. Technological entrepreneurship combines the phenomenon of entrepreneurship with the process of technological innovation.

More recent literature points to the evolution of technological entrepreneurship towards a multifactorial concept, bringing together different perspectives and actors. Petti [2009] argues that technological entrepreneurship includes a set of activities aimed at creating new technologies or identifying pre-existing underdeveloped technologies; identifying and adjusting the opportunities stemming from the use of

these technologies to address emerging market needs; development and application of technology; and business creation.

The concept of technological entrepreneurship emphasizes the interactions between science, technology and business, leading to a more efficient use of research results through the development of new products and other innovative solutions [Beckman, Eisenhardt, Kotha, Meyer, Rajagopolan, 2012; Badzińska, 2016]. It is also increasingly recognized that entrepreneurial orientation is essential for transforming knowledge into innovations [Colovic, Lamotte, 2015].

Technological entrepreneurship requires specialized human resources and the ability to leverage the ongoing technological changes for the benefit of the company.

What is important here are the personal qualities and capabilities of the entrepreneur that affect technological entrepreneurship, specifically including vision, creativity, commitment, management skills, entrepreneurial orientation. At the organizational level, the key factors that can promote technological entrepreneurship are the company's ability to invest in technology resources and intellectual property, the acquisition and development of a skilled workforce, financial management capabilities, the ability to develop relationships with innovative external partners, knowledge management capabilities and the resulting characteristic technological competences. At the macro level, the factors influencing technological entrepreneurship (and innovation) include the level of economic development and macroeconomic conditions, as well as numerous institutional variables, such as political, legal/regulatory, scientific/educational, governmental institutions, commitment, etc. [Autio, Kenney, Mustar, Siegel, Wright, 2014; Kilintzis, Avlogiaris, Samara, Bakouros, 2020]. Many studies on the environmental factors influencing technological entrepreneurship focus on informal and formal institutions [e.g., Audretsch, 2022; Castellacci, 2022].

The dominant strands of research on technological entrepreneurship focus on technology firms (including start-ups) and externalities influencing their creation and development [Bailetti, 2012; Zbierowski, 2017], including the key role of digital transformation and its impact on business operations.

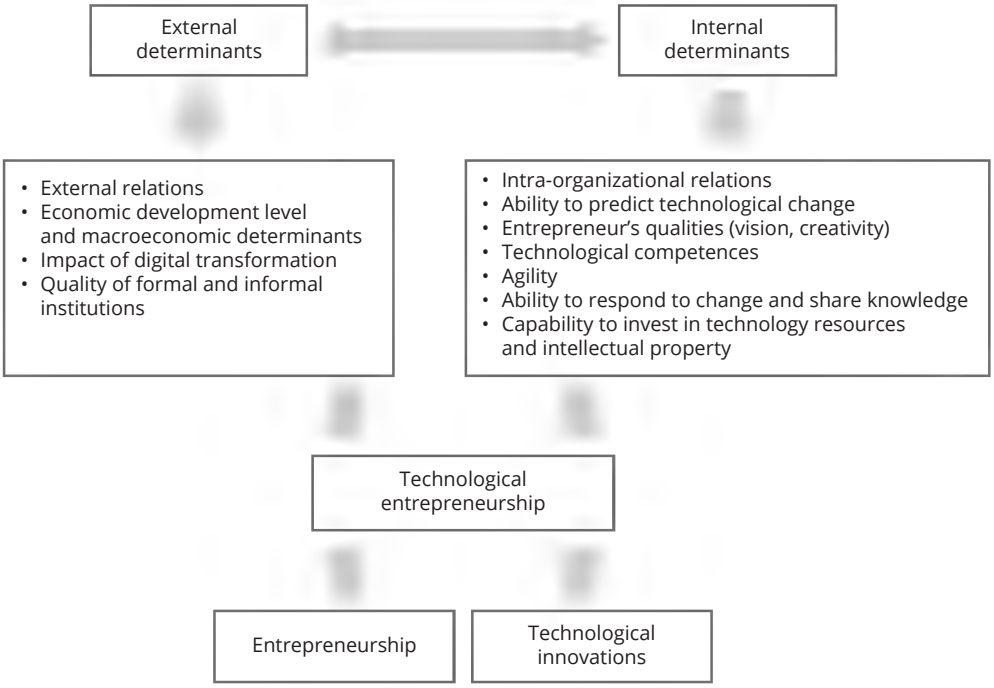
It can therefore be considered that technological entrepreneurship is characterized by such elements as the ability to predict technological change, the ability to manage external and internal relations, and a manner of organizing resources that enables development by taking advantage of emerging technological opportunities [Staniec, 2016].

A summary of the above considerations is illustrated in Figure 9.3.

Studying the level of entrepreneurship on the basis of publicly available empirical data presents many difficulties. The Global Entrepreneurship Index (GEI) is widely used and enables comparative analyses to be performed, but the latest full data for this

indicator for a group of European countries comes from 2017, which, given the events of recent years, will certainly fail to fully reflect the phenomena we are facing today.

Figure 9.3. The concept of technological entrepreneurship and its key determinants



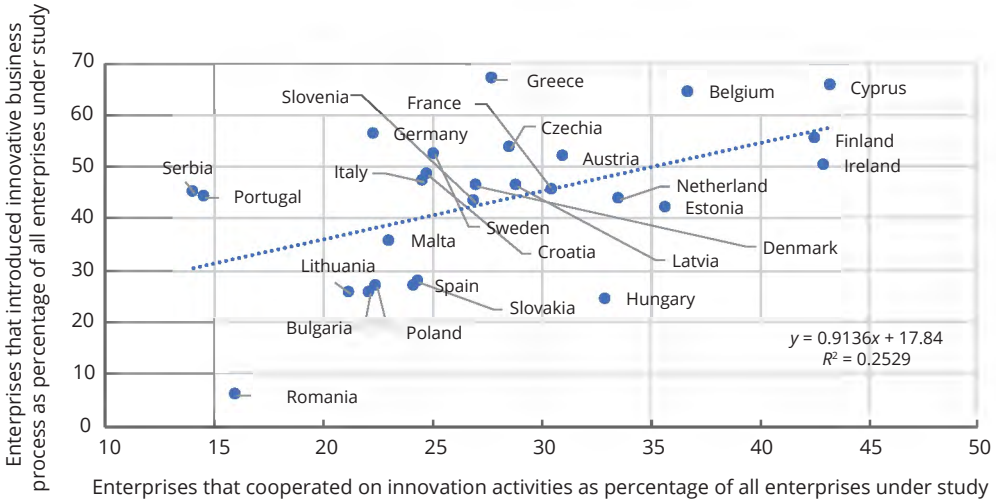
Source: compiled by authors based on literature review.

Therefore, the empirical part will use data from the latest version of the Community Innovation Survey 2018–2020, available in the Eurostat database, developed on the basis of the Oslo Manual [2018] guidelines.

The first of the figures presents a summary of data on the percentage of enterprises declaring business process innovation (a new or improved business process for one or more business functions that differs significantly from the firm's previous business processes) in 2018–2020 with data showing the percentage of enterprises declaring cooperation on innovative solutions in 2018–2020, a key success factor for innovation [Chesbrough, 2003; Chesbrough, Bogers, 2014; Lewandowska, Szymura-Tyc, Gołębiowski, 2016].

The analysis of the data presented in Figure 9.4 indicates large differences between enterprises in European countries, both with regard to cooperation on innovation activities and the intensity of innovation of business processes.

Figure 9.4. Business process innovation intensity vs. cooperation in innovation in European countries in 2018–2020 (%)



Source: compiled by authors based on data from Community Innovation Survey 2020 [Eurostat, 2020a, 2020b].

Enterprises in Cyprus, Ireland, and Finland are leaders both in terms of the intensity of innovation of business processes and cooperation on innovation (Cyprus 65% and 43%; Ireland 50% and 43%; Finland 55% and 42.6%, respectively).

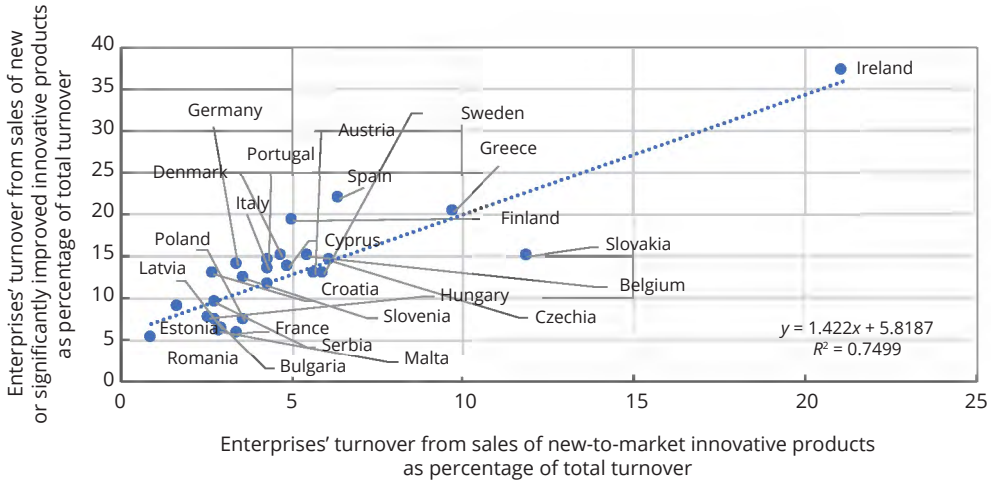
On the other hand, the lowest scores for cooperation in innovation are declared by enterprises in Serbia (14%), Portugal (14.6%), and Romania (16%). Romanian enterprises rank equally low in declared introduction of business process innovations (5.7%).

Enterprises in Poland are characterized by both a low declared level of intensity of introducing business process innovations (27%) and a low level of cooperation (23%).

The next figure presents a summary of data on the sales of new-to-market innovative products as percentage of total sales (treated here as an approximate indicator of technological entrepreneurship) and data on the sales of innovative products (new-to-market but also new and improved new-to-enterprise only) as percentage of total sales in 2018–2020.

The analysis of the data in Figure 9.5 shows that for most enterprises sales of new-to-market products (i.e., those largely reflecting technological entrepreneurship) relative to sales of innovative products, both new-to-market and new-to-enterprise, is quite proportional, at an average of 53% (for the countries under study). At the same time, there are clear leaders in this area, such as enterprises in Ireland (a 57% share and the highest scores for both variables in the sample under study) or Slovak enterprises, where the share reaches 80%, but with much lower values of both sales metrics.

Figure 9.5. Turnover from sales of new-to-market products as percentage of total turnover (treated as an approximate indicator of technological entrepreneurship) of European enterprises compared with percentage turnover from sales of innovative products (new-to-market and new-to-enterprise) in 2018–2020 (%)



Source: compiled by authors based on data from Community Innovation Survey 2020 [Eurostat, 2020b, 2020c].

Among Polish enterprises, a high share of sales of new-to-market products in total sales of innovative products (48%) can be seen; however, both variables had very low values (3.6% and 7.5%, respectively). There is potential for the future if the trend continues.

9.4. Clusters as a factor of innovative entrepreneurship at regional level

Clusters are currently an important factor in innovation and entrepreneurship analyzed at regional level. The best-known definition of a cluster is that it is a "geographic concentration of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also cooperate" [Porter, 1998]. In the modern economy, a dynamic increase can be observed in the importance and popularity of clusters, both as a model of entrepreneurship and an instrument of a country's economic policy. At the same time, cluster policy is part of the activities aimed at stimulating entrepreneurship. This is due to the fact that

clusters are usually shaped following the bottom-up approach, according to which local enterprises, most closely integrated with the regional economy, are the dominant force [Kowalski, 2020]. In this approach to cluster policy, public intervention should be secondary to market-initiated economic development processes. According to the classical concept of clusters, government activities are auxiliary in nature and should not replace entrepreneurship, but can only support and adjust it in those aspects where market failures occur. According to Chatterji, Glaeser, and Kerr [2014], while it is possible to pursue a pro-entrepreneurial policy that is not related to the creation and development of clusters, supporting cluster structures allows many entrepreneurs to be affected simultaneously, ensuring the appropriate scale and higher efficiency of public intervention.

The importance of cluster structures for innovation and entrepreneurship results from their impact on the development of interaction and cooperation between economic operators, as well as between different types of actors of innovation systems, in particular in the context of technology transfer from research and development units to industry. According to Garavaglia and Breschi [2009], entrepreneurship and clusters are interrelated factors that evolve over time, and the formation of clusters of firms is a cumulative process that includes:

1) the supply side, since during normal production activities each firm contributes to the development of labor market resources, the supply of specialized factors of production, and the diffusion of knowledge;
2) demand side, because profit-seeking entrepreneurs create new business entities, both in competition and in cooperation with companies having an established position, in order to satisfy the needs of the market. The development of enterprises and activities in an area often provides new opportunities for other, new business operators in supporting and complementary activities.

The presence of a cluster in a location fosters entrepreneurship by reducing start-up costs, increasing the capacity for innovation and enabling better access to a more diverse range of complementary resources and products [Saxenian, 1994; Porter, 1998; Glaeser, Kerr, 2009]. The co-location of suppliers, competitors, customers, and other institutions also increases the perception of innovation opportunities while amplifying the pressure to innovate [Porter, 2000]. The presence of a strong cluster environment which reduces barriers to entry and growth and enhances regional comparative advantage should be a central driver of entrepreneurial vitality [Delgado, Porter, Stern, 2010]. Entrepreneurship is the mechanism that governs the selection process through which knowledge emerges from the diversity of ideas that can be exploited economically. New companies are therefore a source of diversity, knowledge spillovers and new approaches. Those regions and clusters that show higher rates of

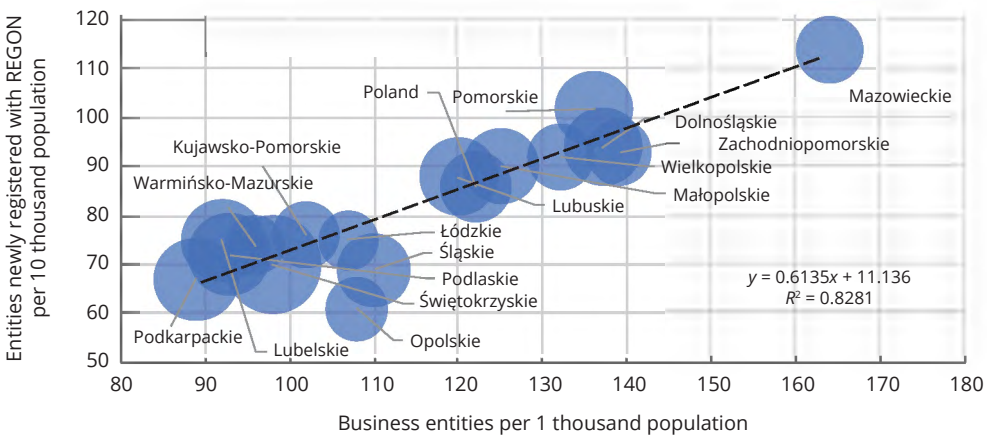
entrepreneurial activity also demonstrate a higher degree of competitiveness and growth rates [Garavaglia, Breschi, 2009].

The results of the analysis on cooperation within clusters relative to the level of entrepreneurship in individual voivodships in Poland are presented in Figure 9.6. The entrepreneurship study took into account two indicators:

1) entrepreneurship index (used in the literature, e.g., by Kałuża, Klepacka-Dunajko [2015] and Karpińska-Karwowska [2017]), usually defined to as the number of business entities per 1 thousand population;
2) new business formation dynamics (e.g., Delgado et al. [2010]; Fritsch, Storey [2014]), which is measured in this analysis by the number of entities newly registered with REGON (National Business Register) per 10 thousand population; according to Garavaglia and Breschi [2011], new firms are a source of diversity, knowledge and technology spillovers, and regions and clusters that show higher dynamics of new business formation are also characterized by a higher level of innovation performance and competitiveness.

The intensity of cooperation in clusters is in turn measured by an indicator representing the share of industrial enterprises cooperating under a cluster initiative or other formalized cooperation framework as percentage of innovation-active enterprises.

Figure 9.6. Cooperation within clusters relative to entrepreneurship level in Poland's regions in 2020



Notes: the size of the circle represents the share of industrial enterprises cooperating under a cluster initiative or other formalized cooperation framework as percentage of innovation-active enterprises.

Source: compiled by authors based on the Local Database of Statistics Poland.

The analysis of the data presented in Figure 9.6 shows a close correlation between the entrepreneurship index and the dynamics of new business formation, but there is

no visible relationship between the level of entrepreneurship and the number of firms cooperating under a cluster initiative or other formalized cooperation framework as percentage of all innovation-active enterprises. On the contrary, it is in voivodeships with a lower level of entrepreneurship that a higher level of cooperation between business entities is noticeable. One of the reasons explaining this phenomenon is that these voivodeships are part of the Eastern Poland macroregion, which receives additional funding from the EU, including under the Operational Programme Eastern Poland 2014–2020 or the programme *European Funds for Eastern Poland 2021–2027*. One of the priorities of these programmes is to promote cooperation and networking, including through cluster initiatives. This way, the availability of EU public support contributes to increasing the level of cooperation between companies in Eastern Poland.

9.5. Conclusions

The following conclusions can be drawn from the analysis in this chapter.

- The innovation performance of the Polish economy compared to the EU average is low, with only a slight improvement visible over the period 2015–2022; most innovation indicators are still below the EU average.
- The relative strengths of the innovative capacity of the Polish economy are, on the inputs side, human resources (as reflected by the share of the population with tertiary education) and, on the outputs side, the creation of industrial designs.
- Resources for the digital transformation of enterprises are relatively well developed in terms of infrastructure (broadband access), but insufficient digital skills and competences of the workforce and society as a whole are weaknesses. Polish enterprises recognize these weaknesses and invest intensively in training aimed to develop digital skills, which can have a positive impact on the development of technological entrepreneurship.
- There are many definitions of technological entrepreneurship in the literature, so it is difficult to define this concept unambiguously. However, it should be pointed out that in most modern definitions of technological entrepreneurship the emphasis is on the interaction between science, technology, and business, leading to a more efficient use of research results through the development of new products and other innovative solutions.
- The key external determinants of technological entrepreneurship include: relations with the environment; the level of economic development and macroeconomic conditions; the impact of digital transformation; quality of formal and informal institutions.

- The key internal determinants of technological entrepreneurship include: relations within the organization; qualities of the entrepreneur (vision, creativity); technological competence; agility; ability to react to change and share knowledge; the ability to invest in technological resources and intellectual property.
- Cooperation, both with entities within the value chain and with competitors and other stakeholders is a entities of the environment, is a major element conducive to raising the level of technological entrepreneurship.
- The latest statistical data from the Community Innovation Survey for 2018–2020 shows that Polish enterprises have low propensity to cooperate for innovative solutions (declared by 22.4% of all surveyed enterprises). This is lower than the European Union average of 28% and much below the scores for cooperation leaders – enterprises in Cyprus, Finland, and Ireland.
- Polish enterprises are much less likely than entities in other countries to declare introducing business process innovations (27%, compared to the EU average of 43%). Only enterprises in Romania, Hungary, Lithuania, and Bulgaria fare worse in this category.
- Polish enterprises declare low sales of new-to-market products (treated here as an approximate measure of technological entrepreneurship) as percentage of total sales, at an average of 3.6%, against an average of 5% for the countries under study.
- Sales of innovative products, both new-to-market and new-to-enterprise, are almost twice lower for Polish enterprises (7.5%) than the average for the countries under study (13%).
- The only indicator that can inspire optimism is the percentage share of sales of new-to-market products in total sales of innovative products, which is relatively high (48%) for Polish enterprises and exceeds the scores for countries such as Romania (17% share) or Estonia (19%).
- Rapid digitalization is an opportunity to strengthen Poland's innovative capacity and therefore broader support for digital transformation and, in particular, for the development of digital skills through new innovation policy tools is needed.
- Clusters are a business model of growing significance, and cluster policy is becoming an important element of public authorities' efforts to stimulate entrepreneurship.
- The model of cluster policy which is the most conducive to entrepreneurship is the bottom-up approach, according to which local enterprises are the dominant force in the creation and development of clusters, public intervention being secondary to the market-initiated processes of socio-economic development.
- The importance of cluster structures for innovation and entrepreneurship results from their impact on stimulating interaction and cooperation between enterprises, as well as between science and business and the related technology transfer.

- Clusters foster entrepreneurship by reducing start-up costs, increasing the capacity for innovation and enabling better access to a more diverse range of complementary resources and products.

Bibliography

Audretsch, D.B., Belitski, M., Caiazza R., Desai, S. (2022). The Role of Institutions in Latent and Emergent Entrepreneurship, *Technological Forecasting and Social Change*, 174. DOI: 10.1016/j.techfore.2021.121263.

Autio, E., Kenney, M., Mustar, P., Siegel, D., Wright, M. (2014). Entrepreneurial Innovation: The Importance of Context, *Research Policy*, 43(7), pp. 1097–1108.

Badzińska, E. (2016). The Concept of Technological Entrepreneurship: The Example of Business Implementation, *Entrepreneurial Business and Economics Review*, 4(3), pp. 57–72.

Beckman, C., Eisenhardt, S., Kotha, A., Meyer, A., Rajagopolan, N. (2012). Technology Entrepreneurship, *Strategic Entrepreneurship Journal*, 6(2), pp. 89–93.

Calvino, F., Criscuolo, Ch., Marcolin, L., Squicciarini, M. (2018). A Taxonomy of Digital Intensive Sectors, *OECD Science, Technology and Industry Working Papers*, 14. DOI: 10.1787/f404736a-en.

Castellacci, F., Oguguo, P.C., Bodas Freitas, I.M. (2022). Quality of Pro-Market National Institutions and Firms' Decisions to Invest in R&D; Evidence from Developing and Transition Economies, *Eurasian Business Review*, 12, pp. 35–57.

Chakravorti, B., Chaturvedi, R.S., Filipovic, C., Brewer, G. (2020). *Digital in the Time of COVID: Trust in the Digital Economy and Its Evolution Across 90 Economies as the Planet Paused for a Pandemic*, https://sites.tufts.edu/digitalplanet/files/2021/03/digital-intelligence-index.pdf (accessed: 30.10.2022).

Chatterji, A., Glaeser, E., Kerr, W. (2014). Clusters of Entrepreneurship and Innovation, *Innovation Policy and the Economy*, 14(1), pp. 129–166.

Chesbrough, H.W. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology.* Boston: Harvard Business School Publishing Corp.

Chesbrough, H.W., Bogers, M. (2014). Explicating Open Innovation: Clarifying an Emerging Paradigm for Understanding Innovation. In: *New Frontiers in Open Innovation* (pp. 3–28), H.W. Chesbrough, W. Vanhaverbeke, J. West (Eds.). Oxford: Oxford University Press.

Colovic, A., Lamotte, O. (2015). Technological Environment and Technology Entrepreneurship: A Cross-Country Analysis, *Creativity and Innovation Management*, 24(4), pp. 617–628.

Delgado, M., Porter, M.E., Stern, S. (2010). Clusters and Entrepreneurship, *Journal of Economic Geography*, 10(4), pp. 495–518.

Dorf, R.C., Byers, T.H. (2005). *Technology Ventures: From Idea to Enterprise*. New York: McGraw-Hill Education.

Dutta, S., Lanvin, B. (Eds.) (2020). *The Network Readiness Index 2020. Accelerating Digital Transformation in a Post-COVID Global Economy*, https://joserobertoafonso.com.br/wp-content/uploads/2021/02/NRI-2020-V8_28-11-2020.pdf (accessed: 30.10.2022).

EC (2022a). *European Innovation Scoreboard 2022*, https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/european-innovation-scoreboard_en#european-innovation-scoreboard-2022 (accessed: 09.11.2022).

EC (2022b). *European Innovation Scoreboard. Methodology Report*, https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/european-innovation-scoreboard_en#european-innovation-scoreboard-2022 (accessed: 09.11.2022).

EC (2022c). *Digital Economy and Society Index (DESI) 2022. Thematic Chapters*, https://digital-strategy.ec.europa.eu/en/policies/desi (accessed: 01.02.2023).

Eurostat (2020a). *Enterprises That Introduced New or Improved Processes by Type of Innovation. NACE Rev. 2: Activity and Size Class*, https://ec.europa.eu/eurostat/databrowser/view/INN_CIS12_SPEC__custom_3729469/default/table?lang=en (accessed: 31.10.2022).

Eurostat (2020b). *Enterprises That Co-operated on Business Activities with Other Enterprises or Organisations by Field of Activities. NACE Rev. 2: Activity and Size Class*, https://ec.europa.eu/eurostat/databrowser/view/INN_CIS12_CO/default/table?lang=en&category=scitech.inn.inn_cis12 (accessed: 31.10.2022).

Eurostat (2020c). *Turnover of Enterprises From New or Significantly Improved Products. NACE Rev. 2: Activity and Size Class*, https://ec.europa.eu/eurostat/databrowser/view/INN_CIS12_PRODT__custom_3738546/default/table?lang=en (accessed: 02.11.2022).

Fachrunnisa, O., Adhiatma, A., Lukman, N., Majid, M.N.A. (2020). Towards SMEs' digital transformation: The Role of Agile Leadership and Strategic Flexibility, *Journal of Small Business Strategy*, 30(3), pp. 65–85.

Fritsch, M., Storey, D.J. (2014). Entrepreneurship in a Regional Context: Historical Roots, Recent Developments and Future Challenges, *Regional Studies*, 48(6), pp. 939–954.

Furman, J.L., Porter, M.E., Stern, S. (2002). The Determinants of National Innovative Capacity, *Research Policy*, 31(6), pp. 899–933.

Garavaglia, C., Breschi, S. (2009). The Co-Evolution of Entrepreneurship and Clusters. In: *Growth and Innovation of Competitive Regions* (pp. 95–116), U. Fratesi, L. Senn (Eds.). Berlin–Heidelberg: Springer.

Glaeser, E.L., Kerr, W.R. (2009). Local Industrial Conditions and Entrepreneurship: How Much of the Spatial Distribution Can We Explain?, *Journal of Economics and Management Strategy*, 18(3), pp. 623–663.

Jones-Evans, D. (1995). A Typology of Technology-Based Entrepreneurs: A Model Based on Previous Occupational Background, *International Journal of Entrepreneurial Behavior and Research*, 1(1), pp. 26–47.

Kałuża, H., Klepacka-Dunajko, I. (2015). Wskaźnik przedsiębiorczości a bezrobocie w Polsce Wschodniej w latach 2007–2013, *Studia i Prace WNEiZ US*, 41, pp. 271–281.

Karpińska-Karwowska, M. (2017). *Analiza uwarunkowań wykorzystania wiedzy jako czynnika rozwoju przedsiębiorczości na poziomie lokalnym*. Białystok: Uniwersytet w Białymstoku.

Kilintzis, P., Avlogiaris, G., Samara, E., Bakouros, Y. (2022). Technology Entrepreneurship: A Model for the European Case, *Journal of the Knowledge Economy*, pp. 1–26. DOI: 10.1007/s13132-022-00950-x.

Kostrzewski, M., Marczewska, M., Chamier-Gliszczynski, N., Woźniak, W. (2020). Digital Twins as Innovation in the Era of Industry 4.0. In: *Proceedings of the 36th International Business Information Management Association (IBIMA)* (pp. 4–5), K.S. Soliman (Ed.). Granada: IBIMA.

Kowalski, A.M. (2020). Towards an Asian Model of Clusters and Cluster Policy: The Super Cluster Strategy, *Journal of Competitiveness*, 12(4), pp. 74–90. DOI: 10.7441/joc.2020.04.05.

Kraft, C., Lindeque, J.P., Peter, M.K. (2022). The Digital Transformation of Swiss Small and Medium-Sized Enterprises: Insights from Digital Tool Adoption, *Journal of Strategy and Management*, 15(3), pp. 468–494. DOI: 10.1108/JSMA-02-2021-0063.

Lewandowska, M.S., Szymura-Tyc, M., Gołębiowski, T. (2016). Innovation Complementarity, Cooperation Partners, and New Product Export: Evidence from Poland, *Journal of Business Research*, 69(9), pp. 3673–3681.

Marczewska, M., Weresa, M.A. (2023). The Digital Transformation of SMEs. In: *DeGruyter Handbook of SME Entrepreneurship*, M. Dabić, S. Kraus (Eds.). Berlin: DeGruyter.

OECD (2019). *Measuring the Digital Transformation: A Roadmap for the Future*. Paris: OECD Publishing. DOI: 10.1787/9789264311992-en.

Oslo Manual (2018). *Guidelines for Collecting, Reporting and Using Data on Innovation*, 4th ed. Luxembourg: Eurostat and OECD Publishing.

Oswald, G., Kleinemeier, M. (2017). *Shaping the Digital Enterprise*, https://link.springer.com/book/10.1007/978-3-319-40967-2 (accessed: 10.11.2022).

Petti, C. (2009). *Cases in Technological Entrepreneurship: Converting Ideas into Value*. Northampton: Edward Elgar.

Porter, M.E. (1998). Clusters and Competition: New Agendas for Companies, Governments, and Institutions. In: *On Competition* (pp. 197–299), M.E. Porter (Ed.). Boston: Harvard Business School Press.

Porter, M.E. (2000). Location, Competition, and Economic Development: Local Clusters in a Global Economy, *Economic Development Quarterly*, 14(1), pp. 15–34.

Saxenian, A. (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge: Harvard University.

Schumpeter, J. (1934). *Theory of Economic Development*. Cambridge: Harvard University Press.

Sidorov, A., Senchenko, P. (2020). Regional Digital Economy: Assessment of Development Levels, *Mathematics*, 8(12). DOI: 10.3390/math8122143.

Staniec, I., (2016). Koncepcja szansy w przedsiębiorczości technologicznej, *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 419, pp. 216–227.

Weresa, M.A. (2022). *Polityka innowacyjna. Nowe tendencje w teorii i praktyce*. Warsaw: Wydawnictwo Naukowe PWN.

Zbierowski, P. (2017). The Aspirations of New Technology-Based Firms in CEE and CIS Countries, *Foresight and STI Governance*, 11(3), pp. 50–60.

Chapter 10

Cultural Dimensions of Entrepreneurship

Lidia Danik, Małgorzata Stefania Lewandowska

10.1. Introduction

Entrepreneurship is a multi-dimensional concept. Schumpeter defines the entrepreneur as a founder of a new firm and an innovator who breaks up established routines and opposes the old way of doing things [Schumpeter, 1912, p. 177]. In contemporary entrepreneurship research, the entrepreneur is defined as a business owner or self-employed person [Grilo, Thurik, 2004]. Many studies dealing with the levels of entrepreneurship focus on its various aspects [Grilo, Thurik, 2004], emphasizing its causes or manifestations [Kaliszczak, 2011], which makes unambiguous conclusions difficult to be drawn.

Entrepreneurship is an important determinant of both personal happiness [Teixeira, Vasque, 2020] and innovation and economic growth [Carree, Thurik, 2010; Galindo, Méndez, 2014]. The determinants of entrepreneurship can be divided into external factors, arising from the (macro and meso) environment, and internal factors, related to the entrepreneur's person. Macro factors result from technical, economic, and cultural conditions and regulations imposed by the government [Grilo, Thurik, 2004]. Research shows that the number of self-employed people in a country is determined by the situation in the labor market and the degree of economic development [Rodriguez-Santiago, 2022]. In turn, the factors determining the number of start-ups are the availability of suppliers and customers in a region, intellectual rights protection, and the situation in the labor market [Gao, Meng, Ling, Liao, Cao, 2022]. The level of entrepreneurship in a country is also influenced by the amount of taxes, the time it takes to set up a business, and the level of democracy [Urbano, Aparicio, Audretsch, 2019, pp. 131–145]. In the case of meso factors related to the activity sector, the literature emphasizes the importance of sector barriers to entry and exit [Grilo, Thurik, 2004]. As for the factors related to the entrepreneur's person, research focuses on factors such as psychological characteristics, education, skills, financial resources, family (including the entrepreneurial experience of parents) [Grilo, Thurik, 2004; Okeremi, Amoako-Gyampah, Divine Caesar, 2021].

It is worth emphasizing that the institutional environment, both formal and informal, influences how individuals behave, also determining their approach to entrepreneurial activities, which may explain the differences in the level of entrepreneurship in individual countries [Alvarez, Young, Woolley, 2015; Urbano et al., 2019; Veciana, Urbano, 2008].

As entrepreneurial activity is deeply embedded in social and cultural norms and values [Krueger, Liñán, Nabi, 2013], national culture is considered to be one of the main determinants of entrepreneurship. The influence of culture on entrepreneurship is exerted through two basic mechanisms: socialization and institutions. Culture affects socialization in the family, school, religious unions, and other organizations. As part of socialization, the individual learns what behaviors are accepted, promoted, and rewarded in a society. Culture also shapes the institutions in a country, which provide a framework for human behavior. Culture influences not only a person's decision to engage in entrepreneurial activity, but also whether a business will continue to operate. It also determines what qualities are expected of entrepreneurs, which further affects entrepreneurial intentions. It influences what norms and values are important in guiding human behavior, creates cognitive schemes that individuals use in their choices [Lortie, Barreto, Cox, 2019]. However, the linkages between culture and entrepreneurship are neither simple nor unambiguous. Little is still known about them [Carree, Thurik, 2010], and the results of the study are fragmentary.

The aim of this study is to demonstrate to what extent the culture of a country, and in particular its individual dimensions, are conducive to entrepreneurship, and to what extent they can be inhibiting factor to it. In the first part of the chapter, the concept of entrepreneurship is defined and the cultural determinants of entrepreneurship according to Hofstede's classification are described. The next part presents the results of an empirical study of the relationship between the level of entrepreneurship and individual dimensions of culture. The last part of the study provides conclusions, limitations, and a proposal for further research.

In the study below, we will use the figures on entrepreneurship collected by Eurostat, and the definition of entrepreneurship will be taken from the Global Entrepreneurship Monitor (GEM), which states that entrepreneurship is "any attempt at new business or new venture creation, such as self-employment, a new business organization, or the expansion of an existing business, by an individual, a team of individuals, or an established business" [GEM, 2022], with the reservation that in the case of data used in this study, this means the registration of a new firm. Data on cultural dimensions will be based on Hofstede's classification.

10.2. Cultural determinants of entrepreneurship

Culture is "a configuration of learned behaviors and results of behavior whose component elements are shared and transmitted by the members of a particular society" [Linton, 1945, p. 32]. It affects the attitudes, values, competences, priorities, and behaviors of social groups, both the whole of humanity (universal level of culture) and supranational groups, representing, e.g., the same political system or religion (supraculture), groups with the same national identity (national culture), industries or professional groups (mesoculture), organization, family (microculture). Different levels of culture influence each other [Srnka, 2004].

Culture is the subject of interest of representatives of many sciences, including – for more than half a century now – economic sciences. The issue of cultural differences is discussed in the literature, including in the context of their impact on social development and economic progress [e.g., Granato, Inglehart, Leblang, 1996], innovation and partnership in innovation [e.g., Danik, Lewandowska, 2021; Lewandowska, 2021], choice of market entry mode [e.g., Stevens, Dykes, 2013], management of an international organization [e.g., Trompenaars, Hampden-Turner, 2002], cooperation between enterprises [e.g., Danik, 2017], or consumer behavior [e.g., Bartosik-Purgat, 2011]. Analyses of management and economic issues most often refer to the level of national culture, which allows international comparisons to be made. The results of research on the dimensions of culture identified by Hofstede [2011] are used particularly often in this case. Despite numerous methodological controversies [cf., e.g., Brewer, Venaik, 2011; Jones, 2007] and the fact that most of the data was collected more than half a century ago [Hofstede Insights, 2022] they are still considered to have significant explanatory value [Jones, 2007]. What is more, as the analysis shows, the results obtained by Hofstede are correlated with those obtained in the World Values Survey [Kang, Kwon, 2018]. Therefore, further considerations will refer to the potential impact on entrepreneurship of the different dimensions of culture identified by Hofstede.

10.2.1. Power distance and entrepreneurship

Power distance (measured by the Power Distance Index, PDI) is related to the extent to which members of a community who do not hold power tolerate the unequal distribution of power and wealth. It translates into the level of hierarchy in workplaces and the distance between social strata. It influences, among other things, how communication between people at different levels of the hierarchy takes place, how decisions are made, how an institution or society is organized [Hofstede Insights,

2022]. In the case of a high power distance, employees are afraid to oppose the boss, accept an autocratic or paternalistic style of management, considering dependence desirable [Hofstede, Hofstede, Minkov, Durska, 2011, pp. 83–86].

In societies with a considerable power distance, there are established hierarchical relationships, and resources are distributed unequally, which can make it difficult for low-power groups to access information, experience, and other resources, and thus prevent potentially profitable opportunities from being identified or exploited [Arrak, Kaasa, Varblane, 2020]. In countries with a high power distance, people from the lower classes may see entrepreneurial activity as something reserved for the elite and therefore not engage in it [Mitchell, Smith, Seawright, Morse, 2000]. On the other hand, in societies characterized by a high power distance, entrepreneurial activity may be the only way to escape either from a despotic boss or from a position determined by birth for someone low in the hierarchy [Zhao, Li, Rauch, 2012].

A study of Malaysian college students found that power distance is not significantly related to the desire to start a business [Samydevan, Mohd Amin, Piaralal, 2021]. This may be related to the level of development of that country because, as Zhao et al. [2012] showed, the power distance, just as collectivism, strengthens entrepreneurship in low- and medium-GDP countries, but hinders it in countries with high GDP. Hence the hypotheses:

- H1a: In countries with low and medium GDP, power distance has a positive impact on entrepreneurship.
- H1b: In countries with high GDP, power distance has a negative impact on entrepreneurship.

10.2.2. Individualism vs. collectivism and entrepreneurship

This dimension refers to the degree of interdependence maintained between members of society. In individualistic societies, people see themselves through the lens of their self-interest and not through the lens of the group, as is the case in collectivist societies. In the former, people care first and foremost about themselves and their family, in the latter, group members take care of each other in exchange for loyalty [Hofstede Insights, 2022]. In individualistic societies, the employee is guided primarily by their own interest, and the employer is obliged to provide working conditions that correspond to the interests of both the employees and the employer. In collectivist societies, employees are expected to subordinate and give up their own needs [Hofstede et al., 2011, p. 128].

Collectivist culture can undermine entrepreneurial attitudes and actions because entrepreneurship is based on the actions of individuals who individually take risks

and are individually rewarded for their activities. Enterprising individuals should have qualities valued in individualistic cultures, such as creativity [Zhao et al., 2012]. An individualistic organizational culture that gives subordinates freedom and autonomy in decision-making increases employees' self-confidence and makes them bolder in implementing new and creative ideas, more willing to look for new opportunities and better cope with uncertainty and risk. This makes enterprises with an individualistic culture have a stronger entrepreneurial orientation [Chew, Tang, Buck, 2022].

A study conducted in Malaysia did not show a relationship between collectivism and entrepreneurial intention [Samydevan et al., 2021], which, as in the case of power distance, can be attributed to low GDP [Zhao et al., 2012]:

- H2a: In countries with low and medium GDP, collectivism has a positive impact on entrepreneurship.
- H2b: In countries with high GDP, collectivism has a negative impact on entrepreneurship.

10.2.3. Masculinity vs. femininity and entrepreneurship

Masculinity (measured by the MAS Index) characterizes those societies in which competition, achievement, heroism, assertiveness, performance, and material rewards are valued. On the other hand, in feminine cultures, personal relationships, quality of life, services, and welfare are important. Cooperation, modesty, care for the weaker are valued [Hofstede Insights, 2022]. This dimension also illustrates the expectations related to the behavior of representatives of the respective genders. In masculine societies, men are expected to be tough, assertive, and focused on material success, while women are expected to be modest, tender, and caring for the quality of life. In feminine societies, both men and women are expected to have feminine attitudes [Hofstede et al., 2011, pp. 156–157].

Masculine traits promote entrepreneurial orientation because they are associated with higher proactivity and competitive mindset [Chew et al., 2022]. However, the results of research are not consistent. As the analysis by Urbano et al. [2019, pp. 57–76] has shown, the high voluntary spirit, self-expression and low masculinity of given society are conducive to early entrepreneurship as measured by the TEA index (percentage of people aged 18–64 who are aspiring entrepreneurs or owners managing new businesses [GEM, 2022a]), and increase the ratio of entrepreneurship geared to seizing opportunities to that resulting from necessity.

In societies with traditional approaches to gender roles and imposing domestic and family responsibilities on women, women often have limited income opportunities [Bullough, Guelich, Manolova, Schjoedt, 2022], which can have a negative impact on

female entrepreneurship. Moreover, in societies with strong stereotypical perceptions of women, in which traits described by Hofstede as feminine are attributed to them, and which contradict traits perceived as necessary for leaders (e.g., assertiveness, competitive propensity), both raising capital for business and entrepreneurial success may be more difficult for women than for men [Bullough et al., 2022]. Recent research confirms that gender stereotypes about entrepreneurs are conditioned by national culture [Gupta, Batra, Gupta, 2022]. However, gender stereotypes are only relevant to entrepreneurship in industries with low female representation [Martiarena, 2022].

It seems that the relationship between the masculinity vs. femininity dimension and entrepreneurship is moderated by many factors, which requires further detailed research. However, taking into account these limitations to entrepreneurial activity in masculine societies, we hypothesize as follows:

- H3: Femininity has a positive impact on entrepreneurship.

10.2.4. Uncertainty avoidance and entrepreneurship

Uncertainty avoidance (measured by the Uncertainty Avoidance Index, UAI) indicates how uncomfortable members of a community feel in uncertain and ambiguous situations. "This feeling is expressed, among other things, through stress and the need for predictability, which can be satisfied by all kinds of laws, regulations and customs" [Hofstede et al., 2011, p. 200]. Members of uncertainty-avoiding societies try to control the future, while in societies with low levels of uncertainty avoidance, the future is simply allowed to happen. High uncertainty avoidance is often accompanied by bureaucracy and a lack of tolerance for unusual behavior or ideas [Hofstede Insights, 2022].

Research shows that openness to change has a significant and positive impact on entrepreneurship. A better tolerance of uncertainty is conducive to the recognition and seizure of opportunities, allows one to better deal with risk and discouragement [Alsaad, 2018], is associated with courage and enthusiasm even when operating in an external environment that cannot be controlled. Moreover, low uncertainty avoidance translates into less bureaucracy, which makes it possible to react more quickly to emerging opportunities [Chew et al., 2022].

High tolerance for new and uncertain situations is more common among entrepreneurs than managers [Samydevan et al., 2021]. Nevertheless, entrepreneurial attitudes are relatively more common in countries with high uncertainty avoidance. Hofstede et al. [2011, p. 219] point out that "this correlation was particularly strongly associated with one aspect of strong uncertainty avoidance, namely a low subjective sense of success in life (happiness) in a society. Self-employment was therefore more often chosen in countries where people felt dissatisfied with life rather than in countries

with greater tolerance for the unknown" [Hofstede et al., 2011]. Considering the above, we propose the following hypothesis:

- H4: Low uncertainty avoidance has a positive impact on entrepreneurship.

10.2.5. Long-term vs. short-term orientation and entrepreneurship

Long-term orientation (measured by the LTO index) indicates the relationship of members of a community with the past, present and, future. In the case of long-term orientation, frugality and education are valued. "Long-term orientation stands for the fostering of virtues oriented towards future rewards, in particular perseverance and thrift. Its opposite pole, short-term orientation, stands for the fostering of virtues related to the past and present, in particular, respect for tradition, preservation of 'face' and fulfilling social obligations" [Hofstede et al., 2011, p. 246]. In the case of short-term orientation, members of society are attached to sacred norms and view societal change with suspicion.

Entrepreneurial activities are associated with innovations, which often require long planning, devoting adequate resources and time to their implementation, as well as a long wait for a return on investment. Moreover, scanning the environment for new opportunities requires patience and long-term thinking [Chew et al., 2022].

Both thrift and frugality as well as perseverance are features of a long-term oriented culture that foster entrepreneurship. Thrifty societies have more resources available to entrepreneurs. Moreover, the expectation of frugality imposes on the individual responsibility for their actions, which fosters entrepreneurial attitudes. Also perseverance, patience, the ability to plan are features that support the success of entrepreneurs. People in long-term oriented cultures are prepared to wait for a return on their investment instead of winding up early. In long-term oriented societies, formal and informal institutions also support entrepreneurs without putting pressure on them to deliver immediate success. On the other hand, the reluctance to change, the preference for social cohesion and stability over thrift and perseverance, characteristic of the short-term orientation, can inhibit entrepreneurial activities. [Lortie et al., 2019]. Hence the hypotheses:

- H5: Long-term orientation has a positive impact on entrepreneurship.

10.2.6. Indulgence vs. restraint and entrepreneurship

Indulgence vs. restraint (measured by the IVR index) determines whether a society allows relatively free fulfilment of basic and natural human drives related to the

enjoying life and having fun. In restrained societies, the fulfillment of human needs is governed by strict social norms [Hofstede Insights, 2022]. Representatives of indulgent societies have a greater sense of control over their lives, do not attach much importance to prudence and thrift, have a positive attitude to life, while in restrained societies a sense of helplessness prevails, and pessimism, cynicism and strong social control are frequent [Hofstede et al., 2011, p. 296].

The source of many religious and social norms is the desire to avoid danger, which in a way combines the dimension of indulgence vs. restraint with uncertainty avoidance. Attachment to tradition and to the observance of customs imposed by religion or family negatively affects entrepreneurship. As Alsaad [2018] writes, people who believe it is worth relying on social norms, rules and long-established procedures to avoid danger are reluctant to take risks and undertake new business. Adhering to such values therefore reduces the likelihood of new firms being set up. Another argument for the positive correlation between indulgence and entrepreneurship is that the sense of happiness, optimism, but also engaging in pleasant leisure activities can stimulate entrepreneurial attitudes, as shown by the study by Dissanayake and Semasinghe [2014], which is exactly the attitude to life that characterizes members of permissive societies. What is more, as apparent from previous studies, it is positively correlated with innovative performance [Khan, Cox, 2017], which in turn is inextricably linked to entrepreneurship [Schumpeter, 1942]. Therefore, we hypothesize as follows:

- H6: Indulgence is positively correlated with entrepreneurship.

10.3. Sample surveyed, operationalization of variables and research method

The empirical part of the study covers 29 European countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland.

Data on the cultural dimensions are taken from the Hofstede website [Hofstede Insights, 2022], where the results of the Values Survey Module [Hofstede, 2013] are published.

Hofstede's original study of the dimensions of culture looked at forty countries [Hofstede, 1980]. A later study, conducted in 1984 [Hofstede, 1984], involved employees from another ten countries. The latest surveys addresses all six dimensions of culture.

The different dimensions of culture are assessed on a scale of 0 to 100 (with minor exceptions for several countries) and describe: power distance (synthetic PDI: low – 0,

high – 100, except Malaysia – 104, and Slovakia – 104); individualism (synthetic IDV: low, indicating collectivism – 0, high – 100); masculinity (synthetic MAS index: low, indicating femininity – 0, high – 100, except Slovakia – 110); uncertainty avoidance (synthetic UAI: low – 0, high – 100, with the exception of Guatemala – 101, Greece – 112, Portugal – 104); long-term orientation (synthetic LTO index: low, meaning short-term orientation – 0, high – 100); indulgence (synthetic IVR: low, meaning restraint – 0, high – 100).

We take the R^2 coefficient level as a measure of the quality of fit of the models created to real data. It indicates what part of variability of dependent variable Y (in this case, the birth and death rate) can be explained by regression, i.e., by linear dependence on variable X (respective dimensions of culture). The coefficient takes the values from 0 to 1, where 0 means no fit and 1 is complete fit.

The sampling mentioned before is dictated by the availability of business data. Unfortunately, the data from the Global Entrepreneurship Monitor, although extensive, cover only some European countries. For this reason, this study will use Eurostat data collected annually in EU member states for the entire enterprise population except subsidiaries of multinationals on two indicators, the so-called birth rates and death rates of European enterprises.

The enterprise birth rate is the number of newly created and registered enterprises in the reference period (t) divided by the number of enterprises active in t. The enterprise death rate is the number of enterprises deregistered in the reference period (t) divided by the number of enterprises active in t. Figure 10.1 presents a comparison of these two indicators for the surveyed sample of enterprises from 29 European countries in 2019.

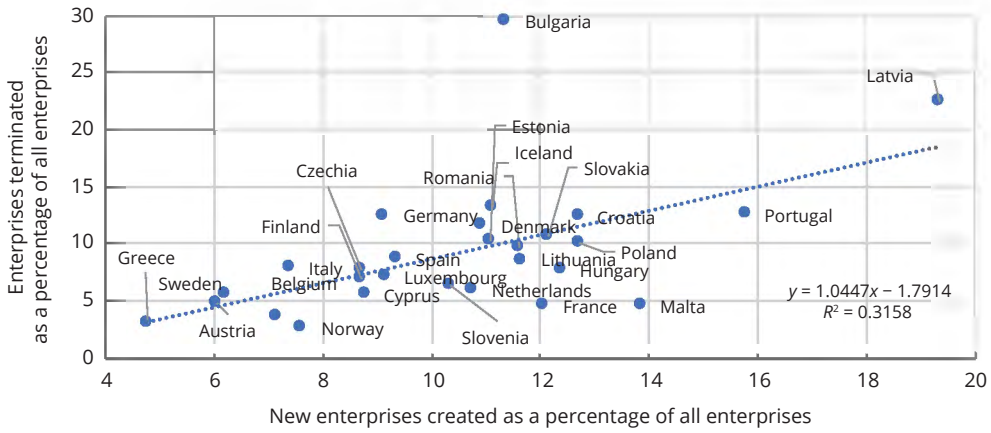
The enterprise birth rate is highest in Latvia, Portugal, Malta, Poland, and Croatia, whereas the death rate reaches the highest levels in Bulgaria, Latvia, Iceland, Portugal, and Germany.

Thus, it is clear that the highest rates of change in both indicators are witnessed in Latvia and Portugal.

From the point of view of the dynamics of both indicators, it is important to what extent the birth rate exceeds the death rate. The highest rates are recorded in Malta (19.9% of births vs. 4.6% of deaths, a difference of 9.2%), France (12.1% vs. 4.6%, a difference of 7.5%), Norway (7.6% vs. 2.6%, a difference of 5.1%), the Netherlands (10.8% vs. 6%, a difference of 4.8%), and Hungary (12.4% vs. 7.7%, a difference of 4.7%).

On the other hand, the countries in which the rate of deaths exceeds the rate of births are Bulgaria (29.5% of deaths vs. 11.4% of births, a difference of −18.1%), Germany (12.5% vs. 9.1%, respectively, a difference of −3.3%), Latvia (22.5% vs. 19.4%, respectively, a difference of −3.1%), Iceland (13.2% vs. 11.1%, respectively, a difference of −2%), and Denmark (11.7% vs. 10.9%, respectively, a difference of −0.7%).

Figure 10.1. Comparison of enterprise birth and death rates in selected European countries in 2019 (%)



Source: compiled by authors based on Eurostat [2022].

10.4. Results of the analysis of relationship between entrepreneurship level and dimensions of culture according to Hofstede's typology

This part of the paper will present the results of an empirical study of the relationship between the previously discussed dimensions of culture and the level of entrepreneurship, measured by the birth rate, carried out for a group of 29 selected European countries, including Poland.

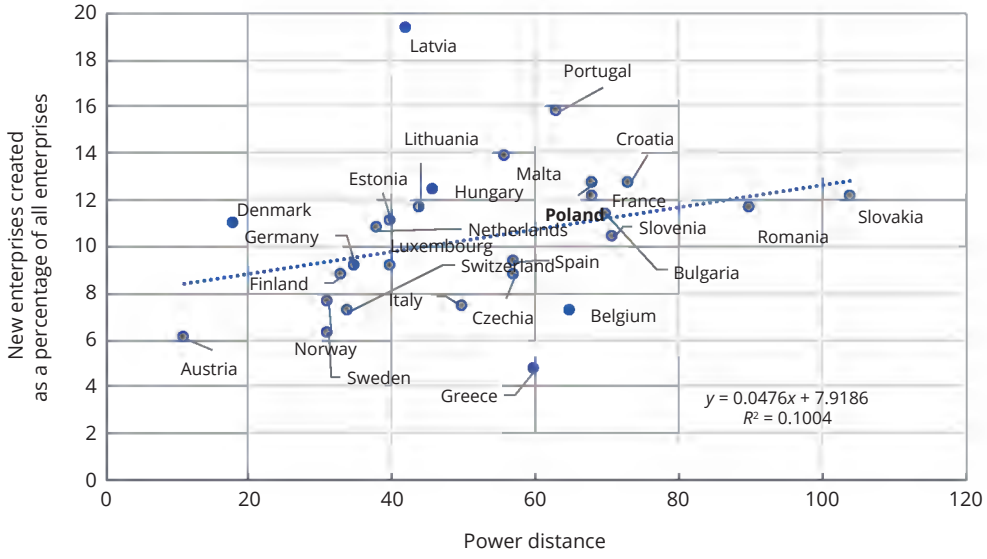
The analysis of the first relationship, carried out for the power distance dimension of culture and for the entrepreneurship level for selected European countries, including Poland, indicates that it is of little importance, so power distance is not significantly related to the desire to start a business.

In Poland, the level of power distance is relatively high for European countries, as is the level of entrepreneurship.

Latvia and Portugal stand out from the whole group of countries surveyed, where the highest entrepreneurship indicators among the countries under study are accompanied by a moderate, although not low, level of power distance.

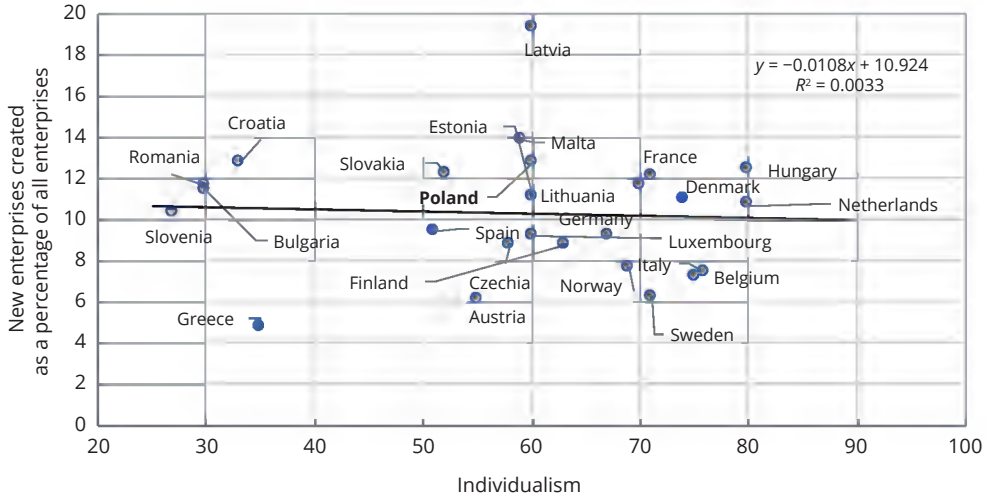
However, there is no relationship between low or medium GDP and power distance and entrepreneurship, R^2 is at a very low level, and therefore we reject the H1a and H1b hypotheses.

Figure 10.2. Relationship between the power distance dimension of culture and the level of entrepreneurship in selected European countries in 2019



Source: compiled by authors based on Values Survey Module (VSM 2013) and Eurostat [2022].

Figure 10.3. Relationship between the individualism dimension of culture and the level of entrepreneurship in selected European countries in 2019



Source: compiled by authors based on Values Survey Module (VSM 2013) and Eurostat [2022].

The next cultural dimension, individualism, refers to the degree of interdependence between members of society. The relationship between the level of individualism

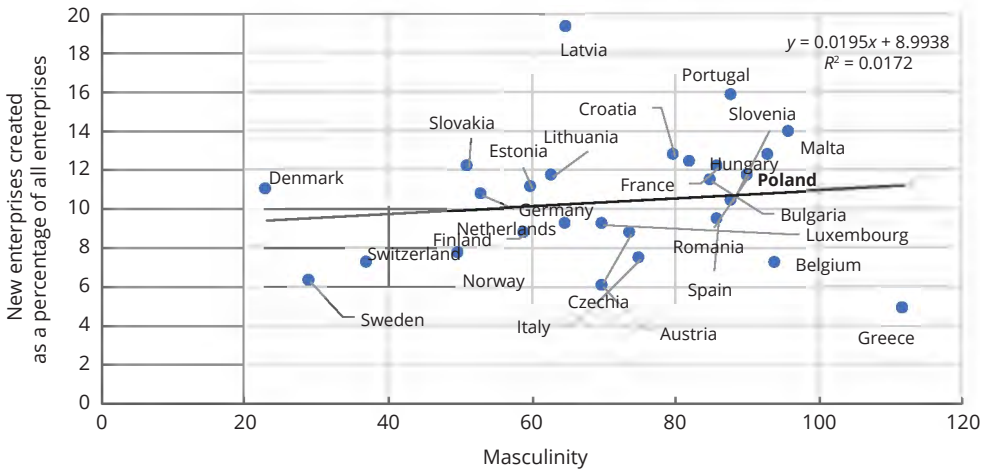
and entrepreneurship is depicted in Figure 10.3. R^2 is very low, so we reject both hypotheses H2a and H2b. No statistically significant relationship between the level of individualism and entrepreneurship has been demonstrated, although it should be emphasized that both dimensions show significant differences between the countries under study.

Masculinity (measured by the MAS Index) characterizes those societies in which competition, achievement, heroism, assertiveness, performance, and material rewards are valued. This dimension, juxtaposed with entrepreneurship level data, does not indicate any substantial relationships. R^2 is again very low, so hypothesis H3 must be rejected.

Another dimension of culture, uncertainty avoidance (measured by the UAI), juxtaposed with entrepreneurship data again does not indicate statistically significant relationships, so hypothesis H4 is rejected.

When analyzing another relationship, it was assumed that long-term orientation has a positive impact on entrepreneurship. Again, no statistically significant relationship was demonstrated, so hypothesis H5 was rejected. However, it is worth noting that in the case of Latvian companies, the extremely high level of entrepreneurship is accompanied by a high level of long-term orientation.

Figure 10.4. Relationship between the masculinity dimension of culture and the level of entrepreneurship in selected European countries in 2019

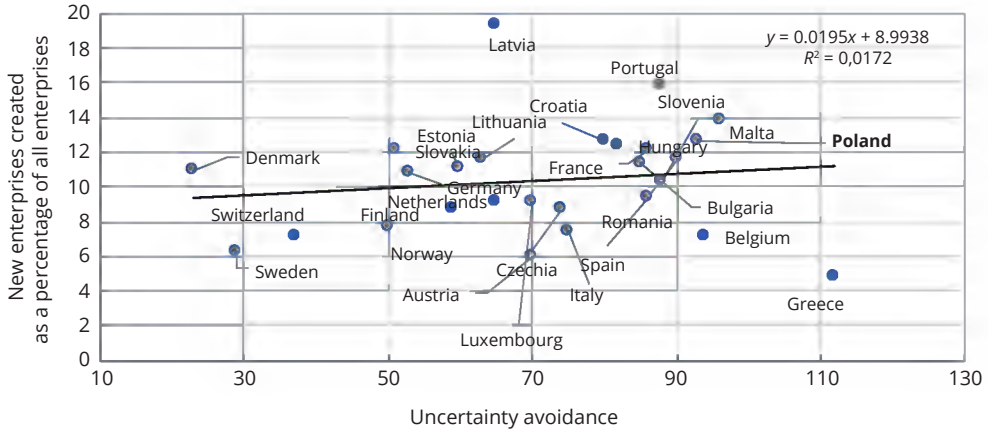


Source: compiled by authors based on Values Survey Module (VSM 2013) and Eurostat [2022].

The last dimension of culture, indulgence (measured by the IVR index), which shows whether a society allows relatively free fulfilment of basic and natural human

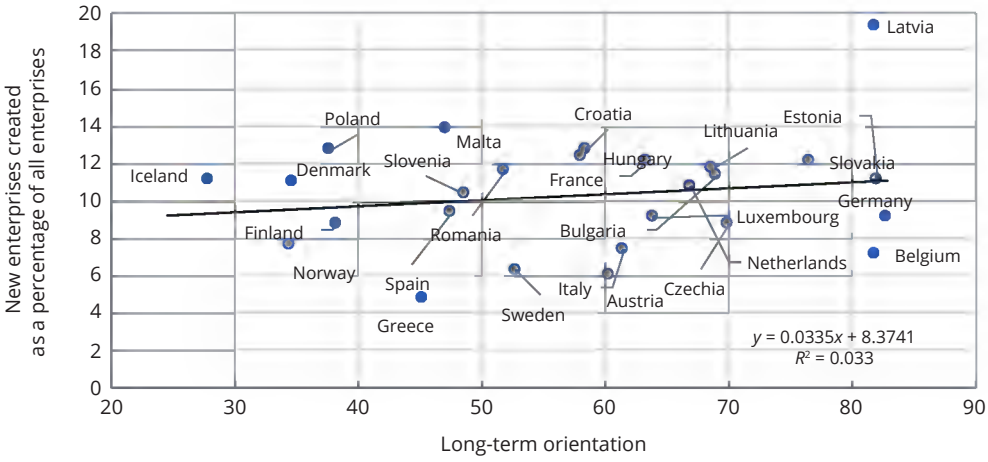
drives related to the enjoying life and having fun, is again confronted here with the entrepreneurship index. Here, the R^2 coefficient is the highest, but it is still so low that we reject the last hypothesis, H6. Interestingly, in the case of the entrepreneurship leader, Latvia, there is even an opposite relationship – a very high entrepreneurship rate is accompanied by a low level of indulgence.

Figure 10.5. Relationship between the uncertainty avoidance dimension of culture and the level of entrepreneurship in selected European countries in 2019



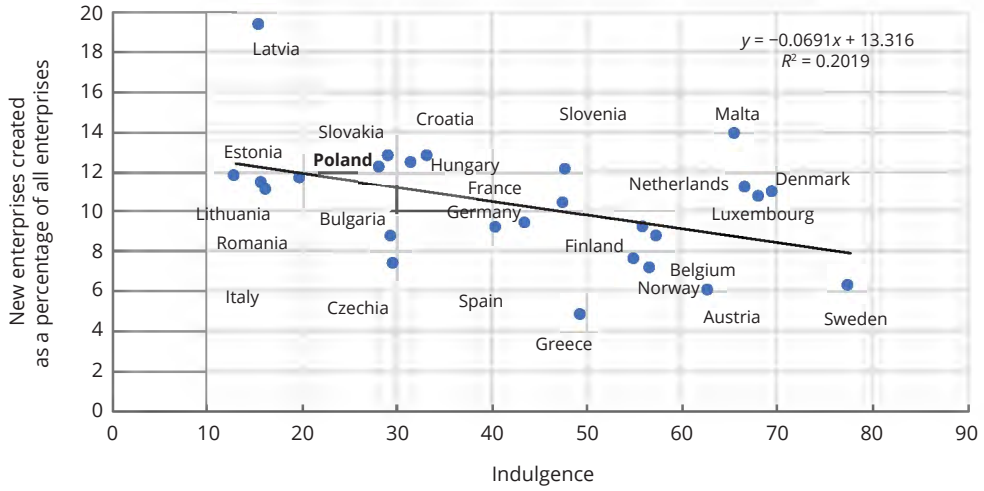
Source: compiled by authors based on Values Survey Module (VSM 2013) and Eurostat [2022].

Figure 10.6. Relationship between the long-term orientation dimension of culture and the level of entrepreneurship in selected European countries in 2019



Source: compiled by authors based on Values Survey Module (VSM 2013) and Eurostat [2022].

Figure 10.7. Relationship between the indulgence dimension of culture and the level of entrepreneurship in selected European countries in 2019



Source: compiled by authors based on Values Survey Module (VSM 2013) and Eurostat [2022].

10.5. Conclusions

The objectives of this study were set at two levels: theoretical and empirical. At the theoretical level, the objective was to present the definitions of culture present in the literature and to discuss its dimensions according to Hofstede's latest typology.

At the empirical level, the objective was to provide a general analysis of the dimensions of culture (power distance, individualism, masculinity, uncertainty avoidance, long-term orientation, indulgence) for selected European countries and Poland, and to examine relationships between the different characteristics of national cultures and the level of entrepreneurship.

The empirical layer of the study provides plenty of interesting information. First of all, it is clear that European countries, although they might appear culturally similar, show far-reaching differences, which leads to the conclusion that they cannot be treated as a homogeneous group.

To sum up the results of the empirical part, it should be noted that:

- the highest change in the birth rate (adopted as a measure of entrepreneurship), meaning the number of newly established and registered enterprises in 2019 divided by the number of enterprises active in 2019, is visible in Latvia;

- on the other hand, the highest change in the enterprise death rate, meaning the number of deregistered enterprises in 2019 divided by the number of enterprises active in 2019, is visible in Bulgaria;
- Poland is characterized by a relatively high enterprise birth rate (12.7%), with the average for the surveyed countries at 10.2%, and a medium death rate (10%);
- the study did not show statistically significant relationships between the six dimensions of culture and the enterprise birth rate (adopted as a measure of entrepreneurship) in the European countries studied, and consequently all the hypotheses were rejected.

The analysis showed that the national culture does not determine the level of entrepreneurship. Taking into account the fact that culture does not evolve dynamically and it is difficult to expect its changes in the short term, this is positive information for entities interested in stimulating entrepreneurship.

The main implication for the economic policy of the countries concerned, especially those in our region, is education in the field of entrepreneurship, but also the need to improve the national innovation system, ICT investment, and improvement, especially in the CEE countries, of macroeconomic performance. These efforts require the adoption of a comprehensive long-term strategy [Gangi, 2017].

In conclusion, it is worth mentioning that this study is not devoid of limitations. What is believed to be an important issue is the often-contested topicality of Hofstede's data, which concern national cultures without taking into account cultural differences at the enterprise level, and are collected at the individual unit level.

Nor does the choice of entrepreneurship measure, i.e., the enterprise birth rate, fully reflect the complexity of the concept and, as shown in the study, it is certainly dependent on factors other than the dimensions of culture.

As for the directions of further research, it would certainly be interesting to deepen the presented results and take into account, for example, other external elements affecting the level of entrepreneurship, including the already mentioned role of national innovation policy. It would also be useful to look at the relationship between entrepreneurship and the dimensions of culture identified by researchers other than Hofstede, as well as the relationship between organizational culture and entrepreneurship at the enterprise level rather than that of entire economies.

Bibliography

Alsaad, A. (2018). The Individualistic View of Culture and the Nascent Entrepreneurship: An Examination of Schwartz's Cultural Values, *Journal of Developmental Entrepreneurship*, 23(04). DOI: 10.1142/S1084946718500267.

Alvarez, S.A., Young, S.L., Woolley, J.L. (2015). Opportunities and Institutions: A Co-creation Story of the King Crab Industry, *Journal of Business Venturing*, 30(1), pp. 95–112.

Arrak, K., Kaasa, A., Varblane, U. (2020). Regional Cultural Context as a Determinant of Entrepreneurial Behaviour: The Case of Germany, *The Journal of Entrepreneurship*, 29(1), pp. 88–118.

Bartosik-Purgat, M. (2011). *Kulturowe uwarunkowania zachowań konsumentów na przykładzie młodych Europejczyków*. Poznań: Wydawnictwo Uniwersytetu Ekonomicznego.

Brewer, P., Venaik, S. (2011). Individualism – Collectivism in Hofstede and GLOBE, *Journal of International Business Studies*, 42(3), pp. 436–445.

Bullough, A., Guelich, U., Manolova, T.S., Schjoedt, L. (2022). Women's Entrepreneurship and Culture: Gender Role Expectations and Identities, Societal Culture, and the Entrepreneurial Environment, *Small Business Economics*, 58(2), pp. 985–996.

Carree, M.A., Thurik, A.R. (2010). The Impact of Entrepreneurship on Economic Growth. In: *Handbook of Entrepreneurship Research* (pp. 557–594), Z.J. Acs, D.B. Audretsch (Eds.). New York: Springer.

Chew, T.C., Tang, Y.K., Buck, T. (2022). The Interactive Effect of Cultural Values and Government Regulations on Firms' Entrepreneurial Orientation, *Journal of Small Business and Enterprise Development*, 29(2), pp. 221–240.

Danik, L. (2017). *Wpływ kultury na jakość relacji w międzynarodowej współpracy przedsiębiorstw.* Warsaw: SGH Publishing House.

Danik, L., Lewandowska, M.S. (2021). Dimensions of Culture and Innovation Linkages. An International Comparison. In: *Poland: Competitiveness Report 2021. Bilateral Economic Cooperation and Competitive Advantages* (pp. 123–144), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Dissanayake, D., Semasinghe, D.M. (2014). Does the Innate Culture Make All Failures to Entrepreneurs? An Existing Context Specific Problem, *International Journal of Scientific and Research Publications*, 4(11), pp. 1–13.

Eurostat (2022). *Structural Business Statistics*, https://ec.europa.eu/eurostat (accessed: 05.09.2022).

Galindo, M.Á., Méndez, M.T. (2014). Entrepreneurship, Economic Growth, and Innovation: Are Feedback Effects at Work?, *Journal of Business Research*, 67(5), pp. 825–829.

Gangi, Y.A. (2017). The Role of Entrepreneurship Education and Training on Creation of the Knowledge Economy, *World Journal of Entrepreneurship, Management and Sustainable Development*, 13(4), pp. 375–388.

Gao, X., Meng, J., Ling, Y., Liao, M., Cao, M. (2022). Localisation Economies, Intellectual Property Rights Protection and Entrepreneurship in China: A Bayesian Analysis of Multi-Level Spatial Correlation, *Structural Change and Economic Dynamics*, 61, pp. 156–165.

GEM (2022). *How GEM Defines Entrepreneurship*, https://www.gemconsortium.org/wiki/1149 (accessed: 04.07.2022).

Granato, J., Inglehart, R., Leblang, D. (1996). The Effect of Cultural Values on Economic Development: Theory, Hypotheses, and Some Empirical Tests, *American Journal of Political Science*, 40(3), pp. 607–631.

Grilo, I., Thurik, R. (2004). Determinants of Entrepreneurship in Europe, *ERIM Report Series*, ERS-2004–106-ORG.

Gupta, A., Batra, S., Gupta, V.K. (2022) Gender, Culture, and Implicit Theories about Entrepreneurs: A Cross-National Investigation, *Small Business Economics*, 58(2), 1073–1089.

Hofstede, G.H. (1980). *Culture's Consequences: International Differences in Work-Related Values*. Beverly Hills: Sage.

Hofstede, G.H. (1984). *Culture's Consequences: International Differences in Work-Related Values* (abridged ed.). Beverly Hills: Sage.

Hofstede, G.H. (2013). *Value Survey Module*, https://geerthofstede.com/research-and-vsm/vsm-2013/ (accessed: 05.09.2022).

Hofstede, G.H., Hofstede, G.J., Minkov, M., Durska, M. (2011). *Kultury i organizacje: Zaprogramowanie umysłu*. Warsaw: Polskie Wydawnictwo Ekonomiczne.

Hofstede Insights (2022). *Hofstede Insights*, https://hi.hofstede-insights.com/faq#FAQ5 (accessed: 05.09.2022).

Jones, M.L. (2007). *Hofstede – Culturally Questionable?*, https://ro.uow.edu.au/commpapers/370/ (accessed: 05.09.2022).

Kaliszczak, L. (2011). Schumpeterowska teoria przedsiębiorczości i jej współczesne implikacje, *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu. Nauki o Zarządzaniu*, 8(216), pp. 345–355.

Kang, M.Y., Kwon, J.W. (2018). Hofstede Cultural Dimension Measuring Through World Values Surveys, *The Institute of Management and Economy Research*, 9(2), pp. 137–152.

Khan, R., Cox, P. (2017). Country Culture and National Innovation, *Archives of Business Research*, 5(2). DOI: 10.14738/abr.52.2768.

Krueger, N., Liñán, F., Nabi, G. (2013). Cultural Values and Entrepreneurship, *Entrepreneurship and Regional Development*, 25 (9–10), pp. 703–707. DOI: 10.1080/08985626.2013.862961.

Lewandowska, M.S. (2021). Dimensions of Culture and Innovation Linkages in the Arab States and in Poland. In: *Poland's Economic Cooperation with the Arab States* (pp. 65–84), A.M. Kowalski (Ed.). Warsaw: SGH Publishing House.

Linton, R. (1945). *The Cultural Background of Personality*. New York: Appleton – Century Company.

Lortie, J., Barreto, T., Cox, K. (2019). The Implications of National and Regional Long-Term Orientation on Entrepreneurial Activity, *International Journal of Entrepreneurial Behavior and Research*, 25(6), pp. 1236–1258.

Martiarena, A. (2022). How Gender Stereotypes Shape Venture Growth Expectations, *Small Business Economics*, 58(2), pp. 1015–1034.

Mitchell, R.K., Smith, B., Seawright, K.W., Morse, E.A. (2000). Cross-Cultural Cognitions and the Venture Creation Decision, *The Academy of Management Journal*, 43(5), pp. 974–993.

Okeremi, A., Amoako-Gyampah, K., Divine Caesar, L. (2021). Exploring the Antecedents of Entrepreneurship Success in Information Technology Firms in Nigeria, *Africa Journal of Management*, 7(2), pp. 286–313.

Rodriguez-Santiago, A. (2022). Re-Evaluating the Relationship Between Economic Development and Self-Employment, at the Macro-Level: A Bayesian Model Averaging Approach, *International Journal of Interactive Multimedia and Artificial Intelligence*, 7(3), pp. 20–25.

Samydevan, V., Mohd Amin, M.R. bin, Piaralal, S.K. (2021). Determinants of Entrepreneurial Intention among School Students in Malaysia: An Empirical Study, *Journal of Education for Business*, 96(6), pp. 359–365.

Schumpeter, J.A. (1912). *Theorie der Wirtschaftlichen Entwicklung*. Leipzig: Duncker and Humblot.

Schumpeter, J.A. (1942). *Capitalism, Socialism, and Democracy*. London: Harper and Brothers.

Srnka, K.J. (2004). Culture's Role in Marketers' Ethical Decision Making: An Integrated Theoretical Framework, *Academy of Marketing Science Review*, 1(4), pp. 1–32.

Stevens, C.E., Dykes, B.J. (2013). The Home Country Cultural Determinants of Firms' Foreign Market Entry Timing Strategies, *Long Range Planning*, 46 (4–5), pp. 387–410.

Teixeira, A.A.C., Vasque, R. (2020). Entrepreneurship and Happiness: Does National Culture Matter?, *Journal of Developmental Entrepreneurship*, 25(1). DOI: 10.1142/S1084946720500077.

Trompenaars, A., Hampden-Turner, C. (2002). *Siedem wymiarów kultury: Znaczenie różnic kulturowych w działalności gospodarczej*. *Publikacje Biznesowe*. Kraków: Oficyna Ekonomiczna.

Urbano, D., Aparicio, S., Audretsch, D.B. (2019). *Institutions, Entrepreneurship, and Economic Performance*. Cham: Springer International Publishing.

Veciana, J.M., Urbano, D. (2008). The Institutional Approach to Entrepreneurship Research. Introduction, *International Entrepreneurship and Management Journal*, 4(4), pp. 365–379.

Zhao, X., Li, H., Rauch, A. (2012). Cross-Country Differences in Entrepreneurial Activity: The Role of Cultural Practice and National Wealth, *Front Bus Res Chin*, 6(4), pp. 447–474.

Summary and Conclusions

Competitiveness of Poland in 2023

Marzenna Anna Weresa, Arkadiusz Michał Kowalski

This monograph belongs to the series of publications on the competitiveness of the national economy prepared annually by a team of authors integrated around the World Economy Research Institute of the SGH Warsaw School of Economics. The focus of the analysis is on the Polish economy, its competitive position and ability, which is determined in comparison to other European Union member states. The traditional concept of competitiveness is defined through the lens of productivity [Porter, 1990, 2008], but new challenges and changing economic conditions have driven the evolution of this concept. Traditional dimensions, such as income competitiveness and investment competitiveness, have been supplemented with new elements, among which technological, digital, sustainable or relational competitiveness play an increasingly important role [Kowalski, Weresa, 2021]. The theoretical framework adopted in this monograph is based on two pillars: competitive ability and competitive position. The first term (competitive ability) represents a factor-based approach showing what components make up the competitiveness of the economy. These are domestic or foreign resources and skills that can be used to improve the broad welfare of society. Competitive position looks at the economy in terms of its performance, such as the level of economic development, social and environmental sustainability or the country's involvement in the international division of labor. There are two-way relationships between competitive ability and position, with the current competitive position resulting from the configuration of factors that make up competitive capacity and the dynamics of their changes in earlier periods, while the current competitive ability determines the future competitive position. The element that binds the two categories together is total factor productivity (TFP). These relationships are captured synthetically in Figure 11.1, which illustrates the analytical framework adopted in the monograph.

The aim of this monograph with regard to theory is to broaden knowledge about entrepreneurship as a factor of the competitiveness of economies and to identify the directions of research on competitiveness, which emerged in the literature in response to new challenges of the 21st century, including the climate crisis, the COVID-19 pandemic, or demographic changes. The purpose of the empirical analyses is to determine the current competitive position of the Polish economy compared to other European

Union countries and its changes in the period 2015–2022, taking into account the role of entrepreneurship for the development of competitive advantages, including the formation of start-ups. Combined with theoretical considerations, the analyses allow conclusions to be drawn for economic policy seeking to strengthen the competitiveness of the Polish economy in the face of intensifying new socio-economic challenges.

Figure 11.1. International competitiveness – the relationship between competitive ability and competitive position

Source: compiled by authors.

Theoretical considerations in this monograph point to a strong and multidimensional relationship between entrepreneurship and competitiveness. Regardless of whatever definition of entrepreneurship is applied, it can be considered that the essence of this relationship is new business formation, as well as the innovation activity of enterprises driving their growth and contributing to achieving technological, organizational or institutional leadership.

In addition, the analysis of the latest literature on the subject carried out as part of the monograph reveals new trends in competitiveness research, which include technological aspects, especially digital technologies and striving for social and environmental sustainability. Digital technologies and sustainable business (e.g., the sharing economy) may become new sources of competitive advantages in the current decade.

The results of empirical research provided in this monograph support the following conclusions about the current competitive position and competitive ability of the Polish economy in comparison to other European Union countries.

- Poland, like other EU countries in Central and Eastern Europe (CEE), has been gradually reducing its income gap with Western European EU countries (EU-14). In

2022, Poland's GDP per capita (at purchasing power parity) accounted for around 74% of average income per capita in the EU-14. In the CEE region, Slovenia (87%), Czechia (85%), Lithuania (80%), and Estonia (80%) perform better than Poland.

- European funds, which contributed to improving the competitiveness of the economy, were an important factor to accelerating the pace of income convergence in Poland.
- In terms of five main macroeconomic indicators describing the general condition of the economy, such as economic growth rate, inflation level, unemployment rate, general government balance, and current account balance relative to GDP, Poland's performance in 2022, as well as that other CEE EU countries, deteriorated in absolute terms. The high level of inflation and the growing general government deficit are currently the biggest challenges facing the Polish economy.
- Poland is one of the European leaders both in terms of the enterprise birth rate and startups as a percentage of all businesses, but the enterprise death rate is also high (the highest in the EU).
- Labour productivity in Poland is one of the lowest among European countries, which to some extent is the result of the highest number of hours worked per person in the EU. In the majority of industries, labor productivity is higher in large companies compared to SMEs (the only exception being the real estate industry). The most efficient industries in Poland are the electricity and gas sectors.
- Entrepreneurship in Poland is positively affected by the increase in the inflow of foreign direct investments (FDI), while the interest of Polish companies in investment expansion abroad has decreased. FDI both from and to Poland is high concentrated geographically in European markets. On a sectoral basis, services prevail, including wholesale and retail trade, repair of motor vehicles, financial and insurance activities, professional, scientific and technical activities.
- The corporate financing system in Poland is dominated by banks. However, the role of credit facilities and loans diminished during the pandemic, and equity was the main source of financing for Polish enterprises. In the long term, venture capital stock relative to GDP is seen to have increased, but its values remain relatively low compared to other EU countries.
- Changes in total factor productivity (TFP) played a significant role as a factor in economic growth of Poland and other CEE countries, which had a positive impact on the income dimension of competitiveness. In the years 2012–2021, the average TFP growth rate was 1.4% per year, the fourth best result in the CEE group of countries.
- Despite the changes in the labor market caused by the COVID-19 pandemic, the employment level in Poland did not change significantly, and the influx of immigrants taking up work did not have a major effect on the vacancy rate.

- The innovation performance of the Polish economy compared to the EU average is low, with only a slight improvement visible over the period 2015–2022. The most innovation indicators are still below the EU average. Polish enterprises exhibit a low propensity to cooperate with academia in the field of innovative solutions, which holds back the development of technological entrepreneurship.
- The digital transformation of Polish enterprises is at an early stage, although the infrastructure necessary for digitization (access to broadband internet) is relatively well developed. Insufficient digital skills and competences of employees and society as a whole remain a barrier. Polish companies recognize this weakness by investing intensively in training aimed at developing digital skills, which in the long run may have a positive impact on the development of technological entrepreneurship and improving the competitiveness of the Polish economy.
- What hampers the competitiveness of Poland is the deteriorating quality of institutions, in particular in legislation, the tax system, the functioning of the judiciary, and insufficient relational capital.

The conclusions arising from the analyses in the monograph suggest the implications of the research results for shaping the economic policy to support competitiveness. One of major priorities of a pro-competitive economic policy is to improve the institutional setting of business and rebuild social capital, in particular trust. Focus should also be placed on supporting collaborative partnership at all levels: between academia and business, between the private and public sectors, and promoting a change in the approach to human resource management in both the private and public domains as well as implementing a more flexible and inclusive organizational culture. Challenges related to digital transformation, ecology, aging society, skills shortages or skills mismatch with the needs of the labor market in Poland require improving the quality of education at all levels and increasing its internationalization. The need to increase funding for R&D and the education sector should also be addressed.

Bibliography

Kowalski, A.M., Weresa, M.A. (2021). International Competitiveness and Cooperation in Times of Economic Crises – Theoretical Aspects. In: *Poland: Competitiveness Report 2021. Bilateral Economic Cooperation and Competitive Advantages* (pp. 13–26), A.M. Kowalski, M.A. Weresa (Eds.). Warsaw: SGH Publishing House.

Porter, M.E. (1990). *The Competitive Advantage of Nations*. New York: Free Press.

Porter, M.E. (2008). *On Competition*. Cambridge: Harvard Business School Publishing.

The goal of this monograph with regard to theory is to broaden knowledge about entrepreneurship as a factor of the competitiveness of economies and to identify the directions of research on competitiveness, which emerged in the literature in response to new challenges of the twenty-first century, including the climate crisis, the COVID-19 pandemic, or demographic changes. The empirical analyses aim to determine the current competitive position of the Polish economy vis-à-vis other European Union countries and its changes over the period 2015–2022, taking into account the role of entrepreneurship for the development of competitive advantages, including the formation of start-ups. The achievement of these goals is supported by the following sub-goals, which are as follows:

- to present the theoretical background of the issue of international competitiveness, taking into account the latest scientific developments;
- to identify the international competitive position of Poland compared to selected countries;
- to identify and assess the importance of the factors crucial to the competitive ability of the Polish economy, as well as their analysis in terms of linkages with entrepreneurship;
- to determine the trends in entrepreneurship development in Poland, with particular emphasis on new business formation, technological entrepreneurship, innovation, and clusters.

Suggested citation: A.M. Kowalski, M.A. Weresa (Eds) (2023). *Poland: Competitiveness Report 2023. Focus on Entrepreneurship and Competitive Advantages.* Warsaw: SGH Publishing House, DOI: 10.33119/978-83-8030-618-9.2023.

SGH PUBLISHING HOUSE
SGH WARSAW SCHOOL OF ECONOMICS
www.wydawnictwo.sgh.waw.pl