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The internationalisation of Polish industries
in the context
of the new institutional economics:
Diagnosis and determinants

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Contents

Introduction

Since the return to market principles, the Polish economy has been exposed to many interdependent processes including transformation, globalisation and integration with the European Union (Gorynia, 2017a, p. 11). These processes have exerted a direct impact on the economy and its development possibilities. In the early years, transformation constituted the dominant driver which enabled growth through the creation of a sufficient and stable institutional environment. Over time, globalisation and integration gained momentum and have determined the degree of economic openness and willingness to participate in international trade. These processes exhibit a multidimensional character and their effects are easily observable from social, political and economic perspectives. Here, attention is devoted to its economic dimension.

The abovementioned processes have shaped the economic system and the country's openness to other economies. Membership in the Common Market initiated growth in the volume of international trade, accelerated the inflow of foreign direct investment and also led Polish firms to invest in foreign locations. For obvious reasons, companies focused their attention on the Single Market where the abolition of trade barriers guaranteed mutually beneficial transactions. It can therefore be assumed that the interrelationships between transformation, globalisation and European integration led to greater international exposure of the Polish economy and in effect increased its degree of internationalisation.

Internationalisation–either of an economy, an industry or a single company–constitutes an ongoing and dynamic process which undergoes major changes over time. Its assessment is complex and mostly comes down to statistical estimation, i.e. an assessment of the degree of internationalisation over a specific timeline. The degree[1] of internationalisation can be understood in the simplest way as an entity's engagement level in international operations.[2] The degree of internationalisation can be described according to such characteristics as depth (intensity),

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[1] In English-language literature, this term is referred to as either the "degree of internationalisation" (cf. e.g. Szymura-Tyc, 2013) or as the "level of internationalisation" (cf. e.g. Cieślik, 2010). In this study, the author will use them interchangeably.

[2] The study distinguishes between the inward and outward internationalisation of the industry, which is reflected in e.g. the research scheme design. Details regarding this division are included in Chapter One. Everywhere the general wording "degree (level) of industry internationalisation" is used it refers to its outward approach.

breadth (geographical scope) or mode (Ietto-Gillies, 2009; Pera, 2017). The results can be presented as either a single variable or a multidimensional composite measure. Moreover, the degree of internationalisation can be assessed at different levels–the micro-, meso- and macroeconomic. Here, the focus is on the meso-level, which means assessing an industry's range of activities in foreign markets.

The impact of a company's degree of internationalisation on its widely understood performance is well researched and proved (cf. e.g. Aggarwal, 1980; Delois & Beamish, 1999; Dunning, 1985; Errunza & Senbet, 1984; Karasiewicz, 2013; Lee, 2010; Lu & Beamish, 2001; Vernon, 1971). However, similar studies for the degree of industry internationalisation are still scarce. The few studies in this area indicate that a high degree of internationalisation in an industry (or as some claim degree of globalisation) boosts the development growth of both the companies as well as the industry itself (Elango, 2010; McElroy, Creamer, & Workman, 1985). Similarly, such a relationship is notable that from a macroperspective standpoint closer international trade relations mean a better performing economy (Pera, 2017). Thus, one can conclude that more in-depth studies are needed into the internationalisation process of industries. The research questions can be twofold: what determines the degree of industry internationalisation; and how has it evolved over recent years. Consequently, these research issues are transformed into the main aim of the publication in hand; which refers to both diagnosing the degree of industry internationalisation in Poland, and determining their internationalisation growth factors.

The overlapping of the mesoeconomic perspective–which encompasses the analysis of industries–and the internationalisation concept raises questions over the cognitive approach adopted. Recently, the abandonment of mainstream economics can be observed in favour of heterodox systems. Unrealistic assumptions behind orthodox economics underlay the main reasons for such a shift. Economic reality is inseparable from uncertainty, information asymmetry, opportunism or bounded rationality in the choices made. Thus many, if not most, of the answers to questions about the internationalisation processes of industries can be sought in new institutional economic ideas which here constitute both the background and the foundation for the analysis.

According to North (1981, 1990) institutions, understood as norms of behaviour, pose a complex system of interdependencies which affects the economy (Dopfer, Foster, & Potts, 2004, p. 266). Therefore, the institutional context cannot be simply erased from the economic equation. Understanding institutions as being sort of "rules of the game" enables the new institutional economic assumptions to be transferred into mesoeconomic analysis. According to Dopfer et al. (2004, p. 271) the creation of norms, and as such institutions, is a process; and each process requires changes and adaptations. They claim that although the initiatives for change arise among individuals (i.e. at the microlevel), their for-

mation–or rather origination, diffusion and retention–take place at the mesolevel. Eventually, the petrification of such rules and norms into a stable structure happens at the macrolevel.

Recent years have brought some increase of interest in studies on industries, which in the classic micro and macro approach received little attention. Still, most research treats industry as a contextual factor in the analysis of firms rather than as a strict research focus. This is partly due to the delimitation problem for terms related to industry and the ability to obtain data. That however–in the author's point of view–cannot justify the neglect of the topic.

Poland is on its way to being transformed from an *efficiency-driven* economy into an *innovation-driven* economy (Jankowska, 2012, p. 10). The key role in its development has been, and will remain, knowledge (Kałowski & Wysocki, 2012, p. 292). One of the ways to enhance a company's state of the art capabilities is, amongst others, *learning-by-exporting* (Blalock & Gertler, 2004; Mińska-Struzik, 2014); which only proves that internationalisation accelerates the company's and industry's growth. Deepening internationalisation can take on various modes. Firstly, the expansion intensity can increase which means scaling-up companies' engagement in foreign market operations. This is frequently accompanied by an increase in the number of exporters and a notable shift towards equity entry mode. Secondly, the internationalisation breadth can broaden, i.e. firms can expand into new geographical markets. What Polish entrepreneurs are often accused of is the focus on European Union markets and a reluctance to take risk in less well-known areas. Focusing on industry internationalisation also involves a practical rationale. It may lead to selecting those industries crucial to the development of the Polish economy. The research design includes both exploratory and practical objectives. Among the cognitive objectives, the following ones are distinguished:
– conceptualisation of the terms concerning the degree of industry internationalisation,
– assessing the transferability of micro-level internationalisation concepts into meso-level analysis and proposing an original measure for the degree of industry internationalisation,
– preparing a ranking of the least and most internationalised industries in Poland,
– examining industries with the largest amplitude of change in their degree of internationalisation between 2007 and 2015.

Additionally, the conclusions drawn from meeting the cognitive objectives would enable the realisation of the practical goal, which can be described as indicating the preferred ways of using the tools supporting the internationalisation of industries within existing government programmes and schemes.

The research goals set required the use of a diverse research workshop, which was based on a hypothetical-deductive approach. The research model proposed

in the study was supported by an in-depth literature analysis. The initial intention to include an inductive approach into the model was abandoned due to the lack of appropriate analysis units that could serve as a reference point. In spite of the undoubtedly valid criticism by Mintzberg (1979) of focusing on quantitative methods to verify hypotheses (or rather on their mere verification instead of the process of hypotheses formulation), some research areas exhibit a greater "predisposition" to use of econometric analysis than others. As in the case of whole economies, analysis of an economic subsystem in the form of industries, where the need for measurement objectivity calls for referring to secondary data, quantitative methods hold certain advantages over qualitative ones. Moreover, taking into account the nature of the research conducted–that to the best knowledge of the author constitutes the first attempt to quantify the level of industry internationalisation in Poland–the use of inductivism could lead to conclusions that are too detailed and, consequently, could pose problems for the generalisation of observed phenomena. Being aware of the shortcomings of the hypothetical--deductive approach, the analysis was–to a small extent–supported by qualitative research that referred to case studies of industries having the largest increase and decrease in internationalisation over the period analysed. The studies developed are of a complementary nature and do not constitute a basis for inferences regarding the research conducted.

The research was mainly based on secondary data collected by the Statistics Poland. However, the construction of an internationalisation measure for industry was also based on the experience of managers, whose opinions enabled a determination of the importance of individual components in the overall degree of internationalisation. These opinions were collected using the Delphi method.

The starting points for the formulation of the research hypotheses were previous theoretical studies as well as the results of empirical research in the area of companies and industries degree of internationalisation. Due to the fact that, as mentioned earlier, the internationalisation of industries is not a commonly undertaken issue, the author mainly relied on experiences drawn from companies and transposed them to the meso level. Among the cognitive objectives of the work, *the identification of key determinants in the degree of internationalisation of industries* was declared. Thus, based on secondary sources relating to the issue, the following hypotheses were suggested:[3]

H1: The higher the level of industry transaction costs, the higher the degree of industry outward internationalisation.

H2a: The industry life cycle phase is positively related to the degree of industry outward internationalisation in production industries.

H2b: The industry life cycle phase is not related to the degree of industry outward internationalisation in non-production industries.

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[3] The hypotheses development can be found in subchapter 3.1.

H3: A higher degree of industry outward internationalisation appears in production rather than non-production industries.

H4: The higher the degree of industry inward internationalisation, the higher the degree of industry outward internationalisation.

H5: The more technologically advanced an industry, the higher the degree of industry outward internationalisation.

H6: The more concentrated an industry, the higher the degree of industry outward internationalisation.

The construction of the hypotheses was based on the assumptions of the new institutional economics (taking into account the significance of transaction costs in shaping the internationalisation process) and the forces of globalisation according to Yip (1989). Consequently, the factors studied are the so-called *push factors*, i.e. the study examined how an industry's environment and its specificity determined the degree of industry internationalisation. The analysis does not include the so-called *pull factors*, i.e. those factors that are attributed to the creation of investment-friendly conditions in foreign markets.

As the literature review reveals, the willingness to internationalise varies depending on the external circumstances. Thus the degree of internationalisation may relate not only to industry specific determinants, but it may also be subject to more general factors. The H1-H6 hypotheses refer directly to the analysis of industry internationalisation determinants while the proposed research scheme includes verifying the impact of economic turbulence, i.e. the economic crisis, on the phenomenon analysed. Thus, in H7 it is suggested that the degree of industry outward internationalisation was higher before and after the economic crisis rather than during its occurrence.

Although the centre of the author's interest remains the degree of industry outward internationalisation, analysing the impact of the economic crisis on the internationalisation process, the author decided to include in the considerations an additional, secondary matter. It concerns the impact the economic crisis has had on the level of industry transaction costs. As indicated earlier, the research is based essentially within the new institutional economics framework, where transaction costs play an important role. This research suggests abandoning the classic approach to "measuring" transaction costs by invoking their classical dimensions (Williamson, 1985) of asset specificity, uncertainty and frequency in favour of the method proposed by Coase (1990) of considering firms' financial statements. Although the author is aware of the fact that this constitutes a complex issue to which separate research should be devoted, an attempt is made here to answer the question how the level of industry transaction costs changed due to the global crisis. Hence, in H8 it is assumed that during the economic crisis, the industry transaction costs were higher than before and after its occurrence.

To achieve the objectives and verify the hypotheses a research scheme was developed and followed, which consequently determined the structure of this publication. Chapter One considers the possibility of analysing internationalisation processes in terms of mesoeconomics. Thus, the aim of the chapter is two-fold: the conceptualisation of an industry, its delimitation and the establishment of its most crucial characteristics, as well as defining the concept of the degree of internationalisation. Based on the literature overview conducted, it is apparent why these two concepts can and should be considered together, and how the achieved degree of industry internationalisation impacts the development of firms, the industries themselves, and even whole economies. The remainder of the chapter is focused on discussing the state's role in the development of this phenomenon.

Chapter Two focuses on idea selection and outlining the theoretical research background on the degree of industry internationalisation. The final choice is preceded by an analysis of the various internationalisation theories used in studies devoted to the determinants of companies' internationalisation processes–which here constitute a reference point for the industry level. Ultimately, the new institutional economics is treated as the main theoretical concept on which the research model is based. Although the concept is more often associated with either the analysis of firms' behaviour (e.g. the choice of entry modes) or the analysis of macroeconomic processes (e.g. the role of institutions in economic development), the chapter is devoted to demonstrating that the new institutional economics can also be used in studying industry issues. The research plan also refers to other concepts (e.g. industry globalisation forces according to Yip); however, it is the new institutional economics that remains the major reference for the analysis. The development directions of industries–including their internationalisation patterns–are created by the behaviour of companies that operate in the reality of opportunism, bounded rationality and uncertainty resulting, *inter alia*, from information asymmetry.

Chapter Three is an introduction to the empirical research that is presented in the subsequent–fourth and fifth–chapters. This chapter covers the most important methodological aspects, including research procedure, sample selection and variable operationalisation. Particular attention is paid to the innovative approach of measuring the level of transaction costs based on Coase's suggestions (1990). The research is conducted on the basis of secondary data gathered by the Statistics Poland (aggregated by the PKD 2007 standards) and provided by the owner of the PontInfo Gospodarka database. The main challenges and limitations encountered in constructing and conducting the empirical analyses are also outlined.

The aim of the study is not only to assess the degree of internationalisation of Polish industries, but also to answer the question as to what determines it. In

search for factors determining this phenomenon, a model is created that refers to two fundamental groups: factors directly related to industry characteristics (type, life cycle, degree of inward internationalisation, level of rivalry, level of transaction costs, technological advancement) and factors associated with broadly defined macroeconomic conditions; in this work represented by whether or not the economic crisis was occurring as the research is carried out over three periods: before, during and after the 2008 economic crisis. Due to the fact that the first group of determinants was discussed in previous chapters, where selected aspects regarding industry and the transaction costs theory are presented, Chapter Four is devoted to the crisis. The analysis is carried out according to the following logic–first, the basic indicators as to the economic development of Europe between 2007 and 2015 are discussed. This serves to outline Poland's position in the international arena. Next, the impact of the crisis on the situation of the Polish economy is discussed, with particular reference to the differences in its course in Poland and other European countries. Finally, considerations are moved to the mesoeconomic level, where an attempt is made to determine how the crisis affected the development of particular industries. This is done by creating a ranking of the industries most and least affected by the crisis.

Chapter Five, the final one, focuses on the empirical verification of previously constructed hypotheses. Based on the secondary data obtained and applying the methods described in the Chapter Three, the cognitive objectives of the work are realised. First, the results of research using the Delphi method are presented, aimed at determining the weights of the proposed measures for the degree of industry outward and inward internationalisation. Then, potential determinants of internationalisation are considered which are verified as to which played a role in the case of Polish industries. Moreover, a cluster analysis is carried out that enables a classification of industries according to the degree of internationalisation they achieved. According to the results in Poland one can distinguish between *local*, *non-equity-based*, *equity-based* and *globalised* industries. As mentioned before, the analysis is based on econometric models. A brief, qualitative discussion[4] of two industries is also included–one of an industry that showed the highest increase in internationalisation in the period under consideration, and the other that showed the largest decline. The whole analysis is summarised with a discussion as to whether and how the state influences the degree of industry internationalisation, which directly refers to the issues discussed in Chapter One.

As the title of this publication suggests, apart from establishing the determinants of the degree of industry internationalisation, it is also important to diagnose its level. As the adopted industry definition refers to the level of classes in

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[4] The word "discussion" instead of a "case study" was used here on purpose since these subchapters do not display all the features of a case study. The author thinks that the phrase "case study" would be a misuse here.

accordance with the PKD 2007 classification of economic activity, the number of units of analysis is very large. Therefore, although a synthetic assessment as to the level of internationalisation was made in Chapter Five, a comprehensive list as to the degree of internationalisation of Polish industries between 2007 and 2015 is included in Appendix 5.

1. Internationalisation as a tool for increasing the dynamics of industry development

As the Polish experiences of the transformation period show, the economy's openness and participation in the international trade market lead to increased economic growth, increased competitiveness of firms, enhanced innovation growth, knowledge flow, and as a consequence, to an increase in the well-being of society. Economic openness also means vulnerability to the negative effects of globalisation that can affect the country through established channels of international cooperation. The effects of globalisation are visible at every level of a functioning economic system–from the sphere of firms, through industries to whole economies. Although much attention is paid to the issue of opening up economies or the foreign expansion of individual companies, the topic of industry internationalisation is much less explored. Industry, on the other hand, as an economic subsystem, is influenced by globalisation, and as a collective itself it can impact processes occurring on both the micro- and macroeconomic level. The diversity of industries in Poland and the recent processes taking place on the international arena encourage, therefore, taking a closer look at this sphere in the context of its involvement in creating international connections.

1.1. Mesoeconomics as research basis for industry development

The economic system is frequently understood as a set of interrelated entities (people, companies and institutions) involved in the exchange of capital and goods on the market (Gorynia, 1995). It is a concept that includes many differentiated units that form unique subsystems. These subsystems also differ from one another due to the lack of homogeneity among the entities that create them. They exhibit distinct dynamics and size. The general theory of systems is useful, while delimiting the subsystems of the economic system, as it assumes that wholeness consists of smaller bits of interrelated hierarchical relations. Therefore, in

the context of economics, the economic system can be divided into sub-levels that will remain dependent on one another.

Over the years, economic science has evolved and altered (or rather added) levels of analysis. The flagship classification for units of analysis is the breakdown into micro- and macroeconomic levels, relating to firms and the entire economy respectively. However, there are also intermediate levels–such as, for example, mesoeconomics focused on industries and regions; the micro-micro level, which refers to individual decisions by people (e.g. agents within a company); as well as its reverse pole, i.e. the global level. Mesoanalysis allows the micro- and macroeconomic perspectives to be combined, at the same time identifying common parts called industries that function in parallel to form the economy as a whole (Gorynia, 1995).

Acknowledging the mesoeconomics as a separate research perspective is mostly attributed to the developments in the industrial economics. The focus of this concept is well described by the *structure-conduct-performance* paradigm, first published by Robinson (1933) and Chamberlin (1933) and later developed by Bain (1959). The paradigm relates to the interactions between market structures and its members' behaviour (conduct) and how these relations affect market and company performance. The concept incorporates the feedback effects and presumes that feedback loop enables both firm and market adjustments. Therefore, the analysis focus is pushed from the firm and economy (micro and macro) level to the analysis of an industry or a group of competing companies (Gorynia, 1996, p. 133). However, the mesoeconomics goes beyond understanding the industry in terms of competition only. What interests the researchers is how industry members compete, cooperate and thus, how they regulate the industry's structure. What additionally makes the mesosystem even more complex is the globalisation effect. The mesosystems have historically been identified as a "component" of a national system (economy) whereas more recently they are perceived as a part of a global system. Therefore, analysing the degree of industry internationalisation can facilitate establishing to what extent one encounters global mesosystems.

Due to the subject of this research the analysis will be limited only to the mesoeconomic level, where the crucial criteria for delimitating the economic subsystems constitute its vertical and horizontal dimensions. The vertical dimension refers to the adoption of the unit of analysis (here, the industry), and in the case of the horizontal dimension to narrowing its geographical scope and the impact it exerts on the consumer. As often happens when defining concepts and terms, it is challenging to find an unambiguous definition of industry in the literature on the subject. Delimitating an industry means defining boundaries that will form a unique sub-system of the economic system (Jankowska, 2002).

When delimitating industry we must once again refer to the vertical and horizontal dimensions. In the vertical approach, delimitation means locating industry

between micro- and macroeconomic perspectives. In this sense, an industry constitutes a subsystem of the national economy, grouping firms and other entities functioning in the market, e.g. institutions. The horizontal dimension in delimitating industry raises more controversy. Apart from geographical scope that can be resolved in a fairly logical and obvious manner,[5] Marshall (1972) declared that the basis for delimitation should be the homogeneity of production technology. Over time, however, analysis from the supply-side perspective proved insufficient. Not all substitute products are obtained through the use of the same technology. Looking at industry from the demand-side perspective, it should be emphasised that an industry is created by those companies that offer a product or service that meets the same needs, regardless of the technological process (Jankowska, 2002).

Delimitating industry with the substitution approach is related to the concept of a substitution gap. Robinson (1969) claimed that products offered on the market create a chain that in some places is disrupted. The discontinuance in the chain is what we call a substitution gap. An industry is composed of those companies that offer products in an uninterrupted part of the chain, up to the substitution gap.

Marshall's activity-based approach to delimiting an industry is mostly criticised due to focus set solemnly on homogeneity of production technology and product features. He does not take into consideration the product substitutability. However, the outcome-based approach is not precise in establishing the industry boundaries. The "demarcation line" remains arbitrary and thus–in practice– the term cannot be operationalised. The industry's boundaries get even more blurry due to product multifunctionality, electronic revolution and technological advancements (Gorynia, 1995, p. 27). Hence, it has been eluded that the supply-side perspective delimits an *industry* and the demand-side perspective refers to a *market*. Neither can be perceived superior as Robinson (1956, p. 361) claims that, "questions relating to competition, monopoly and oligopoly must be considered in terms of markets, while questions concerning labour, profits, technical progress, localisation and so forth have to be considered in terms of industries".

Von Stackelberg (1934) claimed that industry is a term related to the concepts of general and elementary markets. The general market is imperfect and consists of elementary markets, which in turn are fully perfect. An industry in his understanding is an elementary market, where the demand can be described as homogeneous.

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[5] There are three basic geographical delimitations: the administrative approach, the natural geographic approach, as well as the economic and spatial approach (Secomski, 1982). The administrative criterion refers to territorial units distinguished in a given country. The natural geographic delimitation is based on the common natural features of a given region irrespective of the administrative units. The economic and spatial criterion refers to the historical context or social development.

Similarly, Porter (1979) when defining industry referred to the concept of substitutes, assuming that an industry consists of companies remaining in close competition and offering the customer products or services that are one another's substitutes and satisfy the same needs. Porter, however, refrains from limiting the term to a geographical dimension. Likewise, the strategic management approach often invokes the related definition of sector; this again includes companies selling products or services satisfying the same needs, but which are bound by the same geographical market.

Although the industry definition problem remains unresolved, it can be assumed that according to the systemism approach industries display two sets of features–aggregate and structural ones (Gorynia, 1995, p. 46). The aggregate features are created by aggregating the companies' unitary features forming a given industry. Examples of such characteristics are profitability and work efficiency. Structural features, on the other hand, reflect the relationships that exist between the industry's entities. An example of structural properties is for instance its concentration level.

The co-functioning of two frameworks–industry organisation and strategic planning–allows for delimiting a concept closely related to that of an industry. A strategic group is a group of companies that exhibit similar competitive strategies. The behaviour patterns of these industry sub-groups may impact the industry's innovation pace, profitability rate, entry barriers, etc.

Ultimately, the concept of industry cannot be indisputably defined (Table 1.1). The most general and at the same time widely interpretable term is "group of companies delimited according to a given criterion, which (...) immediately signals the existence of a unique set of relations between firms operating within this industry" (Jankowska, 2002, p. 236). With such a definition, another question arises whether an industry should be associated with firms only, or whether it also includes other business entities; such as e.g. industry institutions. Although they do not contribute directly to the production process or service provision to the final recipient, they perform an advisory, lobbying, control, etc. role in relation to companies.[6]

Discrepancies regarding the industry defining approaches may result in posing a question on whether it is indeed feasible to delimit this concept. From the ontological point of view an industry should meet the following arguments (Jankowska, 2002, p. 236):

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[6] Therefore, one encounters a dilemma as to whether it is appropriate to understand industry in a distributive or collective sense (Gorynia, 1995, pp. 45-46). In a distributive sense, an industry simply means a sum of companies that run similar business activities. In a collective sense, an industry also displays features that cannot be directly attributed to the companies operating in it. Thus, the distributive perspective refers to reductionism, while the collective one refers to holism.

Table 1.1. "Traditional" concepts of an industry

Author	Delimitation criterion	Definition of an industry	Critique of the theory
Marshall (1972)	homog-enousness of manufacturing technology	companies manufacturing products with the same technical characteristics (Marshall, 1972, p. 69)	goods may be intersubstitut-able, and identical products may be manufactured using different technologies
Chamberlin (1933)	product substi-tutability	groups of competing firms–pro-ducers of close substitutes (Hay & Morris, 1979, p. 10)	no objective criteria for distinguishing close/distant substitutes
Robinson (1969)	homogeneity of needs	companies offering products in a continuous substitution chain; a chain contains products meet-ing the same needs, regardless of the technology applied and the product characteristics (Robin-son, 1969, p. 17)	invalidity of the thesis about the existence of a continuous substitution chain and oc-currence of substitution gaps only at the points determin-ing industry boundaries
von Stackel-berg (1934), Abbott (1958)		an industry is a perfect market, characterised by homogeneous demand; the sum of such elemen-tary markets creates a holistic market, which is an imperfect market (Abbott, 1958, p. 96; von Stackelberg, 1934, p. 29)	no objective criteria for distinguishing close/distant substitutes
Bain (1959), Porter (1999)	product substi-tutability	a given industry is made up of producers of substitutes (Por-ter, 1999); Bain found that the boundaries of an industry market are determined by a high rate of cross-elasticity (Bain, 1959, pp. 6-7)	no objective criteria for distinguishing close/dis-tant substitutes; reserva-tions about the concept of cross-elasticity of demand (Needham, 1978)

Source: (Jankowska & Kania, 2017, p. 71).

– an industry as a whole should be treated as a higher-level object in relation to the micro-entities (industry members),
– an industry has a specific structure created by its members along with the links they establish,
– relations between individual industry members as well as between industry members and industry as a whole are established by their constant interac-tions.

In attempt to verify how to delimit an industry Jankowska (2002, p. 241) proposes an industry model referring directly to the "substantial being" concept (Figure 1.1).
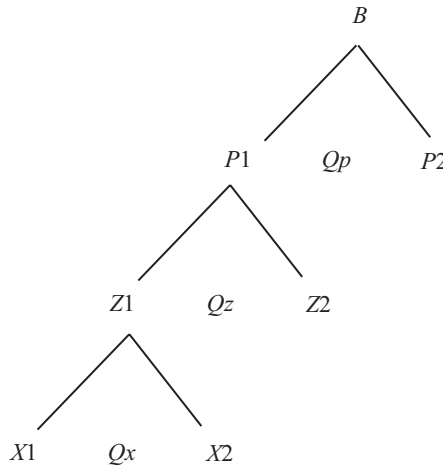
Figure 1.1. The industry model as a "substantial being"

B – an industry
$P1$, $P2$ – industry members
Qp – industry members interactions
$Z1$, $Z2$ – industry members' resources (human capital, assets)
Qz – organisational interactions
$X1$, $X2$ – individual positions within an organisation
Qx – employee interactions

Source: (Jankowska, 2002, p. 241).

It can be concluded that an industry is a collective set of companies since it creates a sub-system of mutually intertwined elements. Simultaneously it can however be questioned whether an industry always exhibits collective features or rather at times can be perceived in a distributive way. Here, it is worth to underline that to delimit an industry one can invoke either the activity-based or outcome-based approach. Imposing the outcome-based perspective results in the creation of a sub-system that should not be called an industry if one refers to the "substantial being" concept. Such sub-system constitutes an apt tool of cognition but its elements do not interact with one another. Likewise, applying the activity-based approach will only qualify the delimited sub-system to be labelled an industry if its components remain related (Jankowska, 2002, p. 242). However, when an activity-based delimitation results in recognition of a sub-system composed of mutually intertwined elements which influence the structure and the functioning of the identified sub-system, one has indeed distinguished *an industry*.

Industry delimitation is all the more difficult as industry boundaries become blurry due to technological progress. Thus, it is difficult to determine whether a given company belongs to one or other industry, or it is in fact present in several industries at the same time, since its products range is so wide (Figure 1.2).
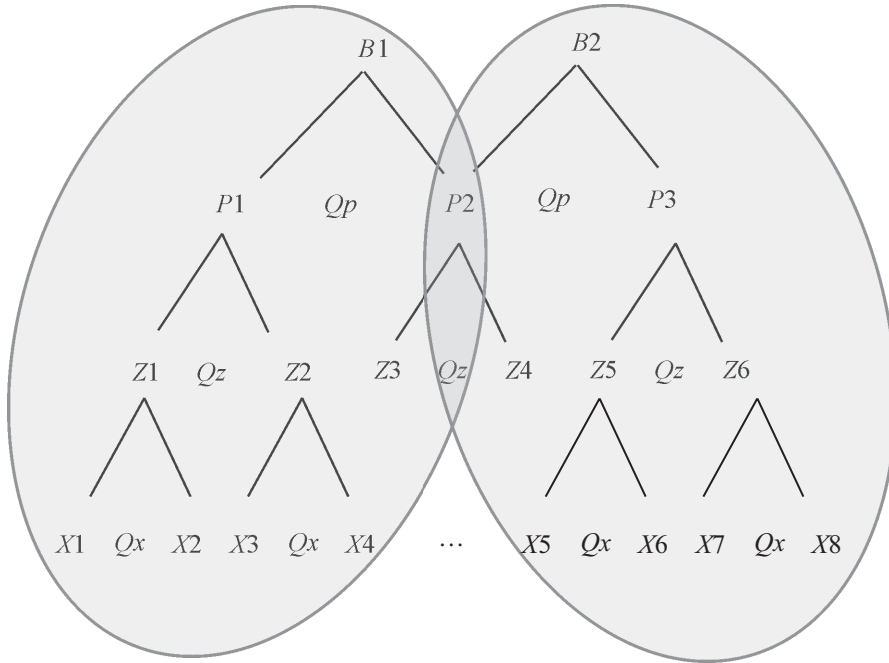
Figure 1.2. Boundaries of industries: simplified model

*B*1, *B*2 – industries
*P*1, *P*2, *P*3 – industry members
Qp – industry members interactions
*Z*1-*Z*6 – industry members' resources (human capital, assets)
Qz – organisational interactions
*X*1-*X*8 – individual positions within organisations
Qx – employee interactions

Therefore, in various studies and statistical databases, it is difficult to find unambiguous criteria defining and distinguishing industries.

Since the industries overlap–or more precisely companies may be present in more than one industry at once–a question arises whether one can actually delimit an industry. If company level is taken as the demarcation level, then the obtained classification may result questionable. However, if one accepts that a company is not a "black box" but an entity of contractual nature, industries may be delimited with use of more in-depth allocation.

In today's economy, companies that exhibit a complex character develop very dynamically. Very often their activities are not limited to a single industry. Within a single company one can distinguish different *business units* dedicated to separate, diversified business activities (Figure 1.3). This applies not only to multinational corporations, but also to local, smaller business. Therefore, in
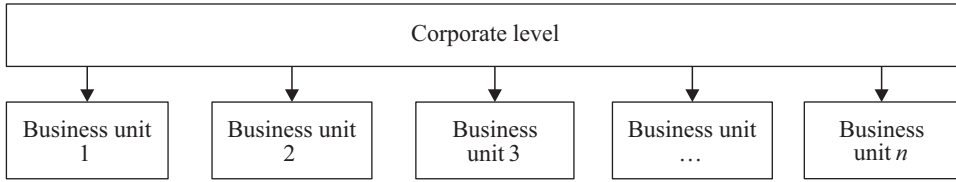
Figure 1.3. Corporate structure analysis–the breakdown into business units

Source: Based on (Johnson, Whittington, & Scholes, 2011).

practice, the analysis of companies from an industry perspective may be significantly hindered.

In the European Union, a common classification of economic activities, based mainly on the Marshall's approach, has been introduced. The European standard includes four levels of classification that vary in detail, and the classification of economic activities is based on the NACE Rev. 2 coding as well as the previous NACE Rev. 1.1 version. The former consists of 21 sections marked with the letters of the alphabet, and within each section three detailed levels of activities
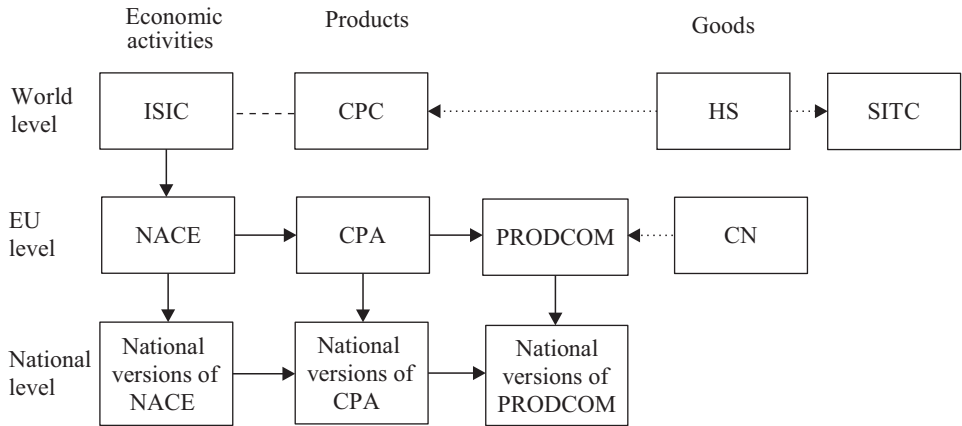
Figure 1.4. The international system of economic classifications

⟶   is the reference classification. Classifications are linked by the structure

⋯⋯▶   is the reference classification. Classifications are linked by conversion table

- - - -   classifications are linked by conversion tables

ISIC – is the United Nations' International Standard Industrial Classification of all Economic Activities

CPC – is the United Nations' Central Product Classification

HS – is the Harmonized Commodity Description and Coding System, managed by the World Customs Organisation

CPA – is the European Classification of Products by Activity

NACE – is the statistical classification of economic activites in the European Community

PRODCOM – is the classification of goods used for statistics on industrial production in the EU

CN – is the Combined Nomenclature, a European classification of goods used for foreign trade statistics

SITC – is the Standard International Trade Classification of the United Nations

Source: Based on (Eurostat, 2008a, pp. 13-14).

are distinguished; namely divisions, groups and classes. It is obligatory for all members of the European Union; however, it is possible to introduce national equivalents to the NACE classification. In Poland, the PKD 2007 classification based on the NACE norms applies (Figure 1.4).

The NACE classification is based on three main principles (Eurostat, 2008a, p. 14):

– exhaustive coverage of all economic activities,
– mutually exclusive categories: each entity can only be classified in one category of the classification,
– methodological principles which allow the consistent allocation of the entities to the various categories of the classification.

As mentioned beforehand, the classification consists of four levels: sections, divisions, groups and classes. The sections relate to very general characteristics, dividing economic activity into production, agriculture, wholesale, retailing, etc. Divisions and groups are distinguished on the basis of three main determinants, with groups being more specific and detailed than divisions (Eurostat, 2008a, p. 21):

– the character of the goods and services produced,
– the uses to which the goods and services are put,
– the inputs, the process and the technology of production.

For each section, the weight of these criteria is different. For example, in Section C (manufacturing) these factors are equally important, but it is not necessarily so for other sections. The last level–classes–is delimited first and foremost by the commonality of the technological processes. Groups that already include the criterion of similarity and the final usage of products are further divided according to the similarity of the technological processes itself. In this context, class seems to correspond to the Marshallian understanding of an industry.

The NACE classification covers a wide range of entities from which statistical data are obtained. Some entities are complex as they include *principal*,[7] *secondary*[8] and *ancillary*[9] activities (Eurostat, 2008a). Where possible, separate entities "should be distinguished and recognised as *kind-of-activity units*" (Eurostat, 2008a, p. 22) which can then be grouped in line with the activities carried out. However, if this is not feasible, the principal activity is used as the allocation criterion. The principal activity is the one that generates the greatest added value for the company. If the added value is not known, alternative measures are used such as the following (Eurostat, 2008a, p. 27):

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[7] An activity with the highest share in the total value added of an entity.
[8] An activity with the lesser share in the total value added of an entity, but whose outputs are in a form of goods or services suitable for delivery to third parties.
[9] An activity that exist solely to support the principal or secondary activities of an entity by providing goods or services for internal use only.

– gross output of the unit that is attributable to the goods or services associated with each activity,
– value of sales or turnover of those groups of products falling within each activity,
– wages and salaries attributable to the different activities (or income of self-employed),
– number of staff involved in the different economic activities of the unit,
– time worked by staff attributable to the different activities of the unit.

An entity performing multiple and integrated activities in which separate categories of economic activity cannot be distinguished is classified using the top-down method. It consists in delimiting sections, divisions, groups and classes in which the company operates and then apportioning the attribution shares (through the use of added value or alternative measures) that an activity exhibits in the firm's operations. First, the section with the highest value added share (or alternative measure) is selected; then, within this section the division satisfying the same criterion; followed by the group; and ultimately within this group a relevant class. As a result, the identified class will be considered the principal activity. However, this may mean that the selected class may not include the entity's largest value added share since by rejecting the other sections one also rejects any allocations in their dependent divisions, groups and classes that individually could amount to a high share of the activities' added value.

Due to the fact that there are many definitions of industry in the literature and the fact that none of these definitions is well reflected in the available statistical data, the author is forced to make some assumptions and simplifications in this respect. In the remainder of the work the term *industry* will be identified with *economic activity*. Referring to Marshall's definition, the closest available equivalent of an industry is the application of *class* in the NACE classification and, consequently, of the PKD 2007 classification applied in Poland. This approach will not take into account the postulate regarding the substitutionality of products and services, which results directly from the availability of data. An attempt to include this requirement in the study would result in great methodological problems and at the same time would cause significant subjectivity in the breakdown applied. Being aware of the limitations in Eurostat methodology presented earlier, this classification will still be used in the proposed research.

For statistical purposes, companies are assigned to classification codes. The PKD 2007 codes are used in Poland, while in global reporting NACE Rev. 2, US SIC or NAICS 2012 are usually applied. In many aspects these classifications are convergent. Companies are assigned to their most basic activity (*primary code*), but those that deal with side activities, are also assigned to additional, side codes (*secondary code*). Table 1.2 presents the percentage of firms operating in

Table 1.2. Percentage of firms operating in more than one group and not reporting any unconsolidated reports for 2015

PKD 2007 Sections	% of firms
Agriculture, forestry and fishing	0.72
Mining and quarrying	1.41
Manufacturing	0.69
Electricity, gas, steam and air conditioning supply	1.13
Water supply; sewerage, waste management and remediation activities	1.84
Construction	0.32
Wholesale and retail trade; repair of motor vehicles and motorcycles	0.69
Transportation and storage	0.36
Accommodation and food service activities	0.34
Information and communication	0.89
Financial and insurance activities	0.69
Real estate activities	1.78
Professional, scientific and technical activities	0.55
Administrative and support service activities	0.89
Public administration and defence; compulsory social security	0.24
Education	0.31
Human health and social work activities	0.25
Arts, entertainment and recreation	0.32
Other service activities	0.11
Activities of households as employers; undifferentiated goods and services–production activities of households for their own use	0[a]
Activities of extraterritorial organisations and bodies	0[a]

[a] – no registered business units in Poland.

Source: Based on Bureau van Dijk (n.d.) (accessed: 5.12.2018).

more than one group and not reporting any unconsolidated reports for the year 2014.

As Table 1.2 indicates, only a small percentage of companies are simultaneously both involved in various economic activities and do not report unconsolidated financial statements. The highest percentage of companies involved in numerous activities is related to the real estate market, while the smallest with other service activities. Most of these problematic firms, however, do not generate high product/service sales revenues in their principal industries; hence the abovementioned percentages do not distort the possibility of conducting industry-focused analyses.

1.2. Industry characteristics and their importance in the internationalisation process

The decision to adopt a certain definition of industry raises further implications. The way in which an industry is understood directly determines its most important characteristics. In this subchapter, two important elements will be discussed that reflect the design of the research scheme. These are the life cycle of an industry, and industry types. The overall remarks here relate to Marshall's understanding of an industry, so it is crucial to remember that in case of other definitions the conclusions drawn from the discussion may not coincide.

1.2.1. The industry life cycle and the internationalisation process

The functioning of an industry is indissolubly linked to the industry life cycle. Previous research has shown that an industry changes over time, and so do its most important characteristics (cf. Argyres & Bigelow, 2007). Depending on the approach, one can distinguish three or four stages in the industry life cycle: growth, maturity and decline; or else: introduction, growth, maturity and decline. Each stage displays different characteristics as presented in Table 1.3.

Table 1.3. The industry life cycle and its characteristics

		Growth	Maturity	Decline
Stage characteristics		• high firm heterogeneity • volatility of companies' market share • volatility of companies' profitability	• standardisation of production • increasing importance of price competition and economies of scale	• increasing industry concentration • decreasing industry heterogeneity
Stage costs	production	high	low	moderate
	transaction	high	decreasing	raising

Source: Based on (Karniouchina, Carson, Short, & Ketchen, 2013; Porter, 1980).

Companies' strategies depend on the industry life cycle stage. In the growth stage an industry exhibits high heterogeneity since the market still lacks a benchmark to which companies might relate. At the same time, production is individualised, which creates high asset specificity, low transaction frequency and high risk levels associated with the level of uncertainty.[10] The industry is, therefore,

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[10] Risk and uncertainty are not the same notions. More on the differences can be found in subchapter 2.4.1.2.

characterised by a high level of transaction costs.[11] The more mature an industry becomes, the lower the transaction costs are. Then market competition increases and production becomes more standardised. One can conclude that asset specificity and uncertainty level decrease while transaction frequency increases. When the industry reaches the decline stage the companies become more concentrated. The industry is less heterogenic since firms remaining within its structures bear a higher risk. The transaction frequency then decreases and this can once again be summarised as the overall level of transaction costs increasing.

However, consecutive stages do not always follow one another without any turbulence on the way, since the economy can in the meantime experience various types of crises. In the simplest terms, an industry crisis can be defined as a disruption in the industry life cycle (Jankowska & Kania, 2017, p. 75). The scope of these crises does not reach far–they affect a particular industry, but sometimes also supporting and related industries. As a result, only dominant companies remain in the industry while many of the existing competitors decide to leave (*shakeout*) (Klepper & Miller, 1995). From a broader long-term perspective an industry crisis may not only affect the mesoeconomic level, but may also "infect" the whole economy (Jankowska & Kania, 2017, p. 87).

In economics two basic concepts, organisational ecology (e.g. Hannan & Freeman, 1977, 1989; Lomi, Larsen, & Freeman, 2005) and dynamic capabilities concern the analysis of industry evolution (e.g. Teece, Pisano, & Shuen, 1997; Wang & Ahmed, 2007; Zollo & Winter, 2002). The first one focuses on an analysis of the number of companies invoking the significance of technological factors. The second one deals with the issue of industry specific skills. However, regardless of the underlying concept, it seems crucial to determine what may cause an industry crisis, as these factors may also indirectly influence the degree of industry internationalisation (Porter, 1999).

The main reasons for the occurrence of industry crises include both exogenous and endogenous factors. Among the first group one can find widely understood innovations and technological advances. The emergence of an innovation determines that a new industry arises that attracts businesses until it loses the ability to generate more profits (Jankowska & Kania, 2017; Jovanovic & MacDonald, 1994). Klepper and Simons (2004) suggest that innovation and market structure develop in parallel. In their opinion, an increase in production capacities is achieved by an increase in research and development expenditures, which in turn results in the shakeout of the least innovative companies. The theory of radical innovation postulates that early innovators are privileged in relation to other companies since other market players are not able to catch up with them.

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[11] More on definition and conceptual differences of transaction costs can be found in subchapter 2.1.4.

Other concepts of industry crises do not refer to Schumpeter's theories (1960) (innovations), but look for reasons for the crisis in the evolution of the companies themselves and in external factors. The *learning by doing* process means that while gaining experience companies increase their ability to reduce marginal costs. This in turn causes new industry entries to arise, but also over time decreases profitability. With increased rivalry, some firms are forced to leave the industry (Carree & Thurik, 2000). Another determinant of a crisis may be industry deregulation, which intensifies competition and increases the concentration level of firms (Tóth, 2012). Similarly, macroeconomic (e.g. demographic, international) factors can influence an industry's life cycle, and thus directly impact the demand for an industry's products/services as well as the situation of related and supporting industries.

In response to industry crises companies may adopt various strategies, one of which is internationalisation. At this point, it is crucial to go back to the definition of an industry, since depending on its understanding we can either see internationalisation as an integral part of industry evolution or as an alternative path to both staying in the domestic market and entering another industry in a different location. The key here is geographical scope which, e.g., is not a distinguishing feature when the industry is delimited by the use of such categories as product substitutability or the homogeneity of needs. Despite the problem of industry's blurry boundaries, here it is assumed that company internationalisation and thus industry internationalisation is an ongoing, integral process in its development. Companies do not alter their activity domain, but in response to changing conditions in the competitive environment they search for demand in a different market than the domestic one. However, since both the assumptions about the homogeneity of production technology and the homogeneity of needs remain unchanged, one can assume that this is one of the possible development concepts in the industry life cycle.

1.2.2. Industry typology and its consequences
for the internationalisation process

Typically, international trade used to be identified with the trade in goods. Therefore, most concepts relating to internationalisation refer directly to manufacturing companies and do not always prove correct in the case of service industries (cf. e.g. Karasiewicz, 2013). The ongoing process of globalisation and the uniformisation of consumer needs have caused service industries to recognise internationalisation as an opportunity to boost their performance (Lovelock, Vandermerwe, Lewis, & Fernie, 2011, pp. 5-20). Since production and service industries exhibit different specificities it is worth taking a closer look at them in the context of their internationalisation abilities.

The main feature that differentiates production from services is the nature of the value added that the client receives. Lovelock et al. (2011, pp. 5-20) indicated the following characteristics associated with services:
– intangible character,
– no physical property rights' transfer,
– differences in distribution channels (physical vs. electronic),
– higher sensitivity to the time factor,
– higher dependence on human capital,
– greater need of adaption to consumer needs,
– no possibility to create inventories.

The main difference between production and services is the *tangible* or *intangible* character of the output delivered. However, not everything that is intangible can be labelled as a service. Industries related to e.g. film production, and the making of videos and TV programmes, which in essence are intangible, are normally perceived as production industries and not service ones (Hill, 1999). Hence, one can conclude that the real distinction between a product and a service is that service provision does not lead to the creation of an *independent output*, but that the actual state of an already existing product changes or the recipient himself/herself receives a certain intangible value.

The differences that exist between products and services also cause differences in the way these industries internationalise, and thus cause potential changes in measuring their degree of internationalisation. Most products can be traded at any time and anywhere, regardless of where they were produced. Such separation does not exist in the case of services where "production" and consumption take place simultaneously (Hill, 1999). This in turn directly affects the entry modes of service companies. In production industries, it is commonly assumed that companies choose between equity and non-equity internationalisation. In particular, companies must decide between exporting (direct or indirect); licensing and franchise agreements; creating a joint venture; opening a branch; or starting production abroad (Meissner, 1990). Theoretically similar modes, including equity and non-equity forms, are available for service industries. Grönroos (1999) suggests that in the case of services we talk about exports (direct or indirect), subcontracting, establishing a foreign branch, and providing services through media (e.g. the Internet).[12] Therefore, it can be argued that in the case of services, the market entry modes are similar, but the range of available options is slightly narrower than in the case of production.

Erramilli (1990) distinguishes between *hard* and *soft* services. Hard services require limited or no physical presence in the foreign market, while soft

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[12] In this sense, Grönroos (1999) assumes that the distinction between products and services can be made on the basis of tangible and intangible values and contradicts the concept of Hill (1999).

services arise as a result of constant interaction between the buyer and the seller. Within soft services Clark, Rajaratnam and Smith (1996) name the following: (1) *contact-based services*, where internationalisation requires the seller's engagement in the foreign market (e.g. direct exports or foreign direct investment); (2) *vehicle-based services*, where direct contact is not crucial (e.g. indirect exports); and (3) *asset-based services*. Examples of such services are respectively: (1) education, (2) media (e.g. television), and (3) banking or tourism.

Due to the heterogeneous nature of services, measuring the degree of internationalisation will not always follow the same pattern as in the case of production industries. Measuring the intensity, scope and concentration of internationalisation for industries that require equity investment is feasible, but for contact-based industries other indicators are applied. Separate studies are devoted to such industries, such as for instance education, where internationalisation is measured using not only quantitative but also qualitative indicators. Since the issue is rather complex different proxies are applied to research-based units and to education providers. The most frequently assessed aspects are the following (van den Besselaar, Inzelt, Reale, & de Turckheim, 2012, p. 30):

– international mobility (both students and staff),
– number/value of international research programmes/projects,
– number of foreign centres/affiliates,
– the international nature of the curriculum,
– international partnerships (joint programmes/diplomas).

In assessing the internationalisation of education the focus is set not on the foreign affiliate sales revenues but on the non-financial aspects. Hence, in the chapters devoted to empirical research, education as well as the activities of households will not be considered.

The life cycle mentioned before is not the only way to characterise an industry. An in-depth analysis of production and service industries reveals that the *Lisbon Strategy* and the *Europe 2020 Strategy* both turn to high-technology industries as catalysts of economic development (Adamik & Zakrzewska-Bielawska, 2014). Therefore, based on the *industry/sectoral approach* and the *product approach* a directory of activities, classified according to their research and development intensity, was created. Eurostat and the Statistics Poland in Poland refer to high--technology, medium-high-technology, medium-low-technology and low-technology manufacturing industries. Among services the distinguishing feature is "knowledge-intensity", which groups the industries into knowledge-intensive services (KIS) or as less knowledge-intensive services (LKIS)[13] (Eurostat, 2008b).

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[13] The sub-groups include: Knowledge-intensive services (KIS), Knowledge-intensive market services, High-tech knowledge-intensive services, Knowledge-intensive financial services, Other knowledge-intensive services; and Less knowledge-intensive services (LKIS), Less knowledge--intensive market services, Other less knowledge-intensive services.

Therefore, the question arises if and how the industry's type can be translated into the achieved degree of internationalisation. The industries were grouped according to the following indicators (Adamik & Zakrzewska-Bielawska, 2014, p. 96):

– the level of scientific intensity, i.e. the level of research and development activity,[14]
– the level of innovation, i.e. the ability to generate, implement and absorb innovations,[15]
– life cycle length of industry products/services,
– demand for highly qualified personnel.

It is assumed that high-technology industries are those that exceed 7% of their expenditure on research and development. They are characterised by high capital intensity, investment risk, and short products/services life cycles. Hence, firms in these industries are characterised by an accelerated rather than a sequential approach to internationalisation (Schwens & Kabst, 2011). An increased competitive struggle within an industry makes it necessary to look for demand in other markets, as the domestic one very quickly becomes insufficient. Thus, the industry type, due to its characteristic features, may determine the degree of industry internationalisation. On the other hand, one must remember that different countries display a different intensity of high-tech activities. In Poland the high-tech companies (according to the industry breakdown) constitute only 9%[16] of all companies that overall generate 6% of export revenues. This is much less in comparison to other countries where high-tech industries are at the forefront of their economy; with China having the highest rate of exports, followed by the European Union (Germany, the Netherlands, France and the UK being in the lead) and the U.S.A.

1.3. Research on the degree of industry internationalisation in international business

The international expansion of companies has become an important subject of research in the field of international business. By entering a foreign market a company expects to maximise its utility and thus assumes that the expansion

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[14] Work conducted to systematically increase the level of knowledge, as well as its application in existing solutions, comprises three types: basic, applied and development research. Acquired knowledge must be characterised by the novelty of implemented solutions (GUS, 2013).

[15] Although the type of innovation is not limited, this reference mainly implies technological innovation (product and process ones).

[16] Data for 2014; however, in the years 2010-2013 this value was similar and did not exceed 10%.

will exert a positive impact on the results achieved (Hitt, Tihanyi, Miller, & Connelly, 2006). One of the key aspects of this process is to determine the degree of involvement in foreign operations. The company's degree of internationalisation informs about "the intensity and extent of its international business activities, i.e. it indicates the level of commitment of the company's resources beyond the borders of the home country" (Przybylska, 2006, p. 41). To investigate the depth and intensity of the degree of internationalisation, not only at the level of the company, but also at the level of an industry or an entire economy, means deepening the knowledge of the relationships between internationalisation and the entity's performance.

1.3.1. Industry internationalisation and globalisation–conceptual differences

The terms internationalisation and globalisation, although often used interchangeably, refer to different yet related phenomena in economic life. Internationalisation can be understood as any activity related to foreign operations. Globalisation, on the other hand, is a wider concept which, through the interactions between an increasing number of societies and institutions, leads to a growing interdependence and intermingling of civilizational and cultural patterns. The main criteria distinguishing the concepts of internationalisation and globalisation are the scope and intensity of activities (Gorynia, 2007, p. 45).

Although the concepts of internationalisation and globalisation are usually related to companies, they can just as successfully be applied to national economies, industries, markets or even single products (Arndt, 1999; Klopf & Nell, 2018, p. 191; Zakrzewska-Bielawska, 2009, p. 340). Frequently, when creating their strategies, companies ask themselves whether they operate in a globalised industry. This question is not entirely correct, since it is not the question whether the industries are globalised, but to what extent they have become globalised (De Kluyver, 2010, p. 23). Both the qualitative approach (based on the Yip model (1989, pp. 35-39)) as well as the quantitative approach (based on the Makhija, Kim and Williamson models (1997)) are used to define the degree of globalisation within an industry. Yip (1989) groups the drivers of industry globalisation into four categories: market, government, cost and competitive. Table 1.4 presents the most important industry globalisation factors broken down into the abovementioned groups.

The quantitative approach to the problem of the degree of industry globalisation is based on two indicators: *level of international linkages* and *integration of industry value-added activities* (Karasiewicz, 2013, pp. 99-100). These indicators are expressed in the following formulas:

Table 1.4. Industry globalisation drivers according to Yip

Group of factors	Globalisation drivers
Market	– the similarity of clients' needs and preferences – existence of global buyers – the ease of transferring the company's operations – existence of leading countries resulting from the competitive advantage of nations – infrastructural similarities
Government	– favourable government policy – state clients and competitors – common regulations – comparable technical standards – the level of state control
Cost	– global benefits of economics of scale – steep learning curve – short technological cycles – supply and logistics efficiency – increasing costs of product development – cost differentiation of countries
Competitive	– exports and imports volume – industry competition structure – the ability to transfer competitive advantage – existence of global competitors – countries' interdependence

Source: Based on (Yip, 1989).

$$LIT_{it} = (X_{it} + M_{it}) / (P_{it} + M_{it} - X_{it}),$$

$$IIT_{it} = 1 - (|X_{it} - M_{it}|) / (X_{it} + M_{it}),$$

where:

LIT_{it} – level of international linkages of industry i in year t;

IIT_{it} – integration of industry value-added activities of industry i in year t;

X_{it} – exports of industry i in year t;

M_{it} – imports of industry i in year t;

P_{it} – production level of industry i in year t.

The IIT measure must be between 0 and 1, where 0 indicates a total lack of intra-industry trade and 1 indicates a maximum level of inter-industry integration. On the other hand, the LIT indicator may take any value greater than 0, with 0 signifying a low degree of international connections, and the value 0.5 constituting the threshold where a high degree of international connections begins. As a result, combining these two indexes brings about a 4-pole matrix that
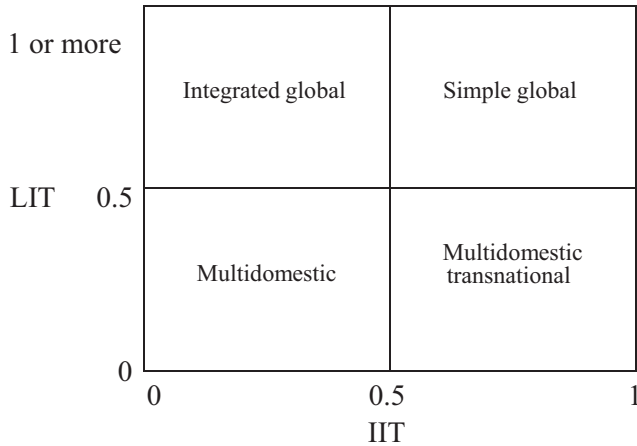
Figure 1.5. Types of industries according to the degree of globalisation

Source: (Makhija, Kim, & Williamson, 1997, p. 690, as cited in Karasiewicz, 2013, p. 99).

divides industries into multidomestic, multidomestic transnational, simple global and integrated global (Figure 1.5).

A multidomestic industry is characterised by a low degree of international connections and a low level of inter-industry integration. This means that its international trade is of very limited scope and thus has a limited impact on its operations. Although these companies do undertake foreign ventures, their presence in other markets is minimal. A multidomestic transitional industry is also focused on the domestic market, but at the same time is export-oriented. It is characterised by a low level of international linkages and a relatively low export-led integration of industry value-added activities. A simple global industry displays a high degree of international trading exchange, which means mass sales of standardised products among many countries. An integrated global industry is, as the name suggests, the most globalised of all, which means both a high degree of international trading exchange as well as integration. Trade is no longer standardised but customised, and very often requires the company's presence in a particular location.

Porter (1986, p. 17) claims that, "the appropriate unit of analysis in setting international strategy is the industry, because the industry is the arena in which competitive advantage is won or lost. (…) Industries vary along a spectrum from *multidomestic* to *global* in their competitive scope". Although Porter only mentions multidomestic and global industries and does not specify stages in-between, he does point to some important consequences of globalisation (Figure 1.6). Multidomestic industries are those where competiton in one country (region) remains independent of competition in other countries (regions). However, a global industry, "(…) is not merely a collection of domestic industries but se-

ries of linked domestic industries in which the rivals compete against each other on a truly world-wide basis" (Porter, 1986, p. 18). Determining what kind of an industry a company functions in has profound implications in managing the company's product portfolio and subsidiary autonomy.

Multidomestic industry   Global industry
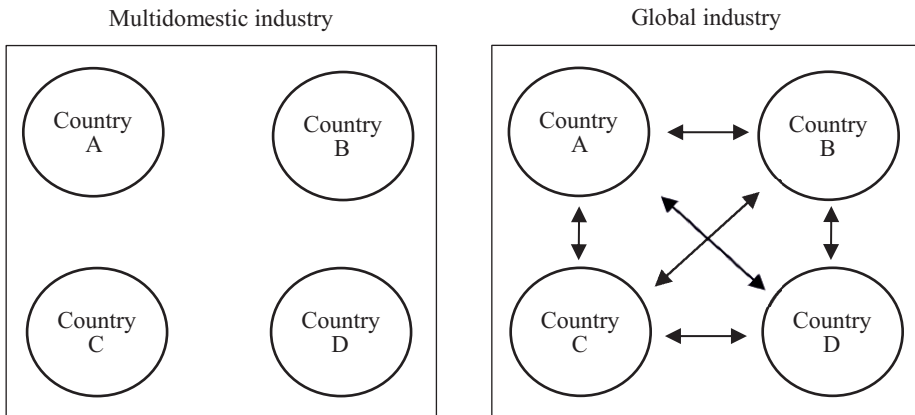
Figure 1.6. Multidomestic and global industries according to Porter
Source: Based on (Porter, 1986, pp. 17-18).

Regardless of the approach (quantitative, qualitative or mixed) in determining the degree of industry globalisation, its recognition as global means that it displays some distinctive characteristics (Hatzichronoglou, 1999, pp. 7-8): global competition, global sourcing, interdependence and diversity of internationalisation channels and forms, and as a consequence the creation of an international network of companies and institutions embedded in the industry. Industries globalise since "the net competitive advantage of a global approach to configuration/coordination becomes significant" (Porter, 1986, p. 36). This can be caused by external shifts in: technology, government policy, buyer needs, country infrastructure, etc. At the same time transition from multidomestic to global industry may be hindered by entry or mobility barriers that result market-specific.

Hatzichronoglou (1999, p. 5) claims that the assessment of globalisation has historically had three stages: (1) measuring the foreign trade level (in particular exports), (2) measuring the offshore production level and the foreign direct investment level, and (3) measuring the geographical decentralisation of R&D centres. The difference between industry globalisation and measuring internationalisation is visible here also. It is customarily assumed that the assessment of the degree of internationalisation does not include technology transfers. Thus, these concepts coincided with the second stage of research, and over time globalisation began to have a wider scope of influence.

Pangarkar and Wu (2012) point to yet another important distinction between industry globalisation and degree of internationalisation. Namely, when measuring the degree of internationalisation one normally estimates its outward and inward levels[17] separately, while in the case of globalisation they are considered together. Such reasoning is based on the comparative advantage concept and theories of competitiveness (Hunt, 1997; Porter, 1990). According to them the domestic market as well as the experience gained in foreign markets together make an impact on industry specificity (Figure 1.7).
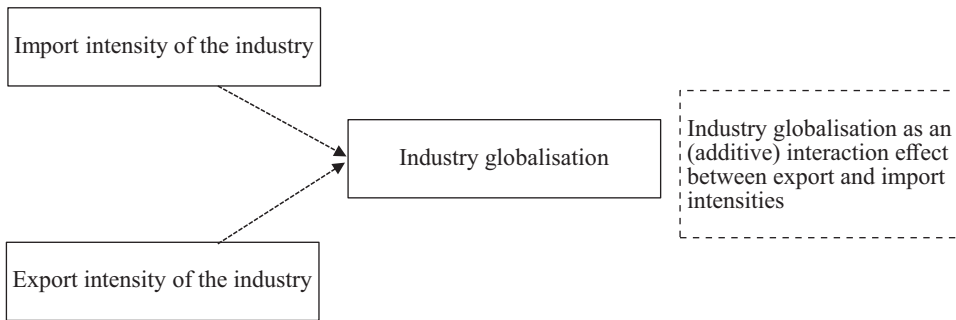
Figure 1.7. Industry globalisation as a measure of import and export intensity
Source: Based on (Pangarkar & Wu, 2012).

Table 1.5. Industry globalisation and internationalisation analysis–conceptual differences

Criterion	Internationalisation	Globalisation
Industry boundaries	limits set by administrative boundaries–usually in accordance with the adopted statistical classification	no geographical or administrative boundaries
Competition	division into domestic and foreign market competition	global competition
Clients	operations in several separate markets	global market
Characteristics	trade and investment level	trade and investment, research and development, level of value-added activities, etc.
Participants	diversified	domination or significant share of transnational companies
Structure	diversified	high intra-industry trade share

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[17] More information on the outward and inward internationalisation approach can be found in subchapter 1.5.

Thus one can see that the concepts of industry globalisation and internationalisation–although they are often used interchangeably–represent different phenomena. A summary of the most important distinguishing features of these two concepts is presented in Table 1.5.

Comparative studies between various OECD countries between 1985 and 1995 allowed for the formulation of some general trends in the internationalisation and globalisation of industries (Hatzichronoglou, 1999, p. 5):

– a higher degree of internationalisation in production industries is definitely more visible within small countries than within large ones,
– a higher degree of internationalisation in production industries is definitely more visible within highly industrialised countries,
– a higher degree of internationalisation in production industries is definitely more visible within countries with a low geographical concentration, i.e. within countries which locate their foreign direct investment in many destinations,
– industries with the highest degree of internationalisation are the *high-tech* and *medium-high-tech* industries,
– the degree of internationalisation is more dependent on the industry specificity rather than the country specificity.

1.3.2. The concept and meaning of the degree of internationalisation in international business

Currently, international trade, which determines the economy's degree of openness, is very closely related to industry performance. Thus, being a member of the international trade network means improving financial performance (Melitz & Ottaviano, 2008; Soares & Quintella, 2008) as well as participating in the benefits stemming from economies of scale (Eaton & Kortum, 2006; Helpnam & Krugman, 1985). As a result, many authors postulate the thesis that a country having a significant share of exports leads to positive changes in its economic efficiency (cf. e.g. Balassa, 1978, 1985; Krueger, 1980), therefore justifying research on the degree of internationalisation of companies, industries and even whole economies.

The first comprehensive studies[18] on the degree of internationalisation date back to the 1970s. The attention of the researchers was drawn by the question

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[18] These studies are understood as studies in which the degree of internationalisation is treated as a multivariate measure and is not limited to measuring export revenues only. The author is aware that in many previous studies such an indicator was taken into account–usually as a control variable. However, the first research which focused strictly on multidimensional measurement of the degree of internationalisation and its impact on the company performance appeared in the 1970s.

as to whether and to what extent the internationalisation process affects company performance, broadly understood. The theoretical background in this respect is extremely extensive as it relates to the internalisation of processes (Buckley & Casson, 1976; Rugman, 1980), location advantages (Dunning, 1980; Kogut, 1985), knowledge transfer (Kogut & Zander, 1993), and also to the economies of scale (Kobrin, 1991). At the same time, with the increase in the number of arguments on the positive relation between internationalisation and performance, concepts highlighting the negative effects also spread. Increased costs of management and control (Bartlett & Ghoshal, 1988; Jones & Hill, 1988) contribute to an elevated risk in running operations (Delios & Henisz, 2000; Rugman, 1980), and finally, to the weakening of the company's competitive position. Bearing in mind conceptual considerations and empirical research, several main trends can be observed in relation to how the internationalisation-performance curve evolves.

Depending on the research entities and the context in which the study is embedded, the relationship between the degree of internationalisation and financial performance usually takes one of the following three forms: a reversed J-curve, an S-shaped curve or a U-shaped curve. Theories on foreign direct investment (Hymer, 1976) claim that launching a foreign venture, especially in a greenfield form, is associated with the existence of certain barriers: increased control and competition level, adjustment requirements, complexity of operations and administrative costs. Therefore, despite the fact that in the initial phase of activities a positive relationship can be observed between the degree of internationalisation and performance, companies quickly reach a point of contraflexure after which the dependency takes on a drastically negative character. Empirical confirmation of the relationship in the form of an inverted J-curve was found for instance by Caves (1982), Calvert (1981), Buckley and Casson (1985), and Geringer, Beamish and daCosta (1989).

Benito and Welch (1997) agree that the internationalisation process causes the costs to increase to such an extent that the marginal cost exceeds the marginal revenue achieved. However, in contrast to proponents of the concept of a "J-shaped curve", they argue that along with the internationalisation adjustments appear (see Chandler, 1962; Miller & Friesen, 1980), such as the experience effect, which reverses the initially negative relationship. As a result, the dependency takes the form of the "U-shaped curve."[19] In this case also the concept has supporting empirical evidence. Hitt, Hoskisson and Kim (1997) found that such a relationship is most often observed among companies that are managed by teams with extensive experience of working in a rapidly changing environment.

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[19] However, Gomes and Ramaswamy (1999) find evidence in their research for a dependency that takes the shape of an inverted U-shape. This feature is demonstrated by those companies which undertake internationalisation among countries with a significant psychological and cultural distance to their home country.

The latest research on the degree of internationalisation and company performance indicates that the relationship takes the form of a sinusoid or perhaps a horizontal "S-shaped curve" (Contractor, Kundu, & Hsu, 2003). This relationship is divided into three stages, where the transition from one stage to the next depends on the consequences of the internationalisation process. Therefore, some companies, in deciding to abandon operations in foreign markets, may be held at the first or second stage, thus changing the shape of the observed distribution. The first stage is consistent with the Uppsala model (Johanson & Vahlne, 1977), where companies decide to start their internationalisation in geographically close markets. The positive effects of internationalisation are not immediately visible, but the costs resulting from the penetration of unknown locations are. Thus, in the first stage, the relationship between the observed variables is negative. Companies that, despite the burden of initial costs, decide to continue foreign operations, move to the second phase where the nature of the observed relationship changes. The experience effect and economies of scale appear while fixed costs are spread over more locations (assuming that internationalisation activities include new geographical directions) (Kogut, 1985; Porter, 1985). Unlike the second stage, in the third phase the pursuit of intensified internationalisation may prove much less favourable for firms. Problems with managing a diversified portfolio of foreign investments, declining profit rates and the lack of new, lucrative directions to expand may lead to the reversal of the dependency.

Regardless of the form, most empirical studies leave no doubt that a relationship between the degree of internationalisation and financial performance exists.[20] The shape it takes may depend on many factors, including the type of company, the industry in which it operates, institutional and socio-economic conditions, as well as many other (Chang, 2011; Rugman & Sukpanich, 2006). Irrespective of the shape and its determinants, research at the microeconomic level has shown that the degree of internationalisation is an important aspect of a company's operations and this gives grounds to presume that similar relationships can be observed at other levels of analysis.

Considerations as to the degree of internationalisation usually regard one of the following dimensions: intensity, extensiveness and concentration. The studies on intensity focus mostly on financial measures, e.g. revenue or profitability in foreign markets. Extensiveness research surveys the geographical scope of expansion and is usually linked to identifying preferable modes of entry. Thus this dimension refers mostly to company-level analysis. Concentration investigations

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[20] Not all studies confirm that this relationship exists among all the surveyed companies. Tallman and Li (1996) find such confirmation in the case of companies originating from the USA, but they could not draw similar conclusions in the case of global corporations. Contractor, Kumar and Kundu (2007) state that while this relationship exists, it is much stronger for production companies than for service companies.

are also closely linked with the geographical aspect; here, however, the reverse relationship is under study–if and to what extent different locations are able to attract investment. This is assessed by use of the Herfindhal index (Davies & Lyons, 1996; Ietto-Gillies, 2002) or the Lorenz curve (Fisch & Oesterle, 2003). The focus on a particular dimension, and what follows the operationalisation of associated concepts, depends on the aspect that is under consideration:
– innovation and knowledge transfer,
– international trade structure,
– the competitiveness level of transnational companies and other entities,
– activities' efficiency.

The transfer of knowledge and innovation was initially related to the product's life cycle (Vernon, 1966). In line with this concept, and along with the product, technology transfer was also passed on from developed countries to developing ones. Kogut and Zander (1993) expand this concept by indicating that the transfer itself takes place along with the network, and includes both entities within the capital group that initiates the transfer, as well as entities in the local environment in which the network is established. With regard to the concept of product life cycle and the evolutionary theory of the firm (e.g. Hedlund, 1986; Hedlund & Rolander, 1990; Nelson & Winter, 1982) the degree of internationalisation can be considered at various levels; micro-, meso-, and macroeconomic; as they affect both the strategy of the companies themselves and the country's economic policy, including tools targeted at particular industries. The degree of internationalisation will be considered here mainly from the perspective of its extensiveness, since the implications arising from the transfer of innovation in different geographic locations are taken into account.

The structure and size of international trade is most often linked with an analysis of foreign direct investment and interindustry exchange. In this sense, the degree of internationalisation can refer to different dimensions: intensity studies, in the case of questions as to how individual entities (countries, industries, companies) make use of global international exchange; or extensiveness studies, in the case of questions as to how trade or investments are broken down in the context of geographical expansion.

In research taking into account a company's competitiveness and the efficiency of its activities', the degree of internationalisation is seen from a cause rather than a result perspective. This means that attention is focused on seeking the competitiveness determinants that may result from international activities. These can be e.g. the diversification of potential locations (extensiveness research), or experience acquired through scale effects (intensity research).

1.4. Degree of industry internationalisation–a review of empirical research

The literature of the subject very broadly refers to the issue of internationalisation as well as to the organisation of industries–provided that these topics are treated separately. However, there are few studies merging the issues together. A review of the existing literature revealed only a few publications that touch on the degree of industry internationalisation; and, moreover, in most of these cases the research focus was not set on the degree itself (Mroczek-Dąbrowska, 2016c, pp. 4-5).

Most of the studies that took the process of industry internationalisation into consideration were done in the 1990s. This was due to the effect globalisation was having on socio-economic life. The degree of industry internationalisation (or as some claim degree of globalisation) is analysed mainly in the context of the impact it exerted on companies' internationalisation strategies. A brief summary of selected research items in the field of industry internationalisation is presented in Table 1.6.

Table 1.6. Degree of industry internationalisation–a review of selected studies

Study	Industry type	IID[a] – operationalisation	Sample	Research focus
The industry as the center of research interest				
Kobrin (1991)	manufacturing industries	intra-industry trade index	56 industries	structural characterics of an industry
Makhija et al. (1997)	chemical and manufacturing industries	indicator based on the extent of an industry's inter-national linkages and the integration of value-added activities within the industry	cross-comparison of 27 industries in 5 countries	assessment of the degree of industry internationalisation
Hatzichronoglou (1999)	production industries	multidimensional indices for the degree of industry outward and inward internationalisation	cross-comparison of 19 industries in 5 countries	assessment of the degree of industry internationalisation and globalisation

Study	Industry type	IID[a] – operationalisation	Sample	Research focus
The industry as the context of research design				
Vahlne and Nordstrom (1993)	–	categories: national, regional, global	–	–
Tüselmann, Allen, Barrett and McDonald (2008)	not specified	Transnationality Index	484 companies	employee relations approaches in subsidiaries
Thai and Chong (2008)	not specified	no operationalisation–case study approach	4 companies	industry structure as determinant of born-global strategies
Wiersema and Bowen (2008)	not specified	intra-industry trade index	14,784 observations (panel data)	degree and scope of international diversification
Pangarkar and Wu (2012)	6 industries	export and import intensity of an industry	166 companies	impact of industry internationalisation on company performance
Asakawa and Rose (2013)	service industries	no operationalisation–case study approach	n/a	internationalisation of Japanese service industries
Yang, Lu and Jiang (2017)	not specified	global industries identified in Kobrin (1991) and the level of international trade (LIT) index	1,263 companies	impact of industry globalisation on company performance

IID[a] – degree of industry internationalisation.
n/a – not available.

Global industries–those that do not fall under the administrative boundaries of countries–are commonly researched from a mesoeconomic perspective. Assessments as to the extent to which individual industries are globalised are undertaken by, among others, Makhija and others (1997), and Hatzichronoglou (1999). Hatzichronoglou focuses his work on comparing the degree of industry internationalisation for selected OECD countries.[21] These studies allow for

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[21] Hatzichronoglou (1999) does not specify exactly what level of economic activity he understands under the term "industry". In his study he refers to national and international classifications,

an analysis of production industries in two dimensions–first, a cross--industry comparison as to the degree of internationalisation regarding overall production activities in the 21 countries; and secondly, an evaluation of 19 selected industries among 10 selected OECD countries (USA, Japan, Germany, France, Great Britain, Italy, Canada, Sweden, Ireland, Finland). This analysis covers the years 1985-1995 and assesses degree of both the outward and inward internationalisation. Makhija and others (1997) created an industry globalisation matrix based on the extent of an industry's international linkages and the integration of value-added activities within the industry.[22]

Kobrin (1991) in assessing industry structure and evaluating which industries can be called global applied the case study method. He identified 10 industries where the intra-industry transactions in foreign markets generated more than 25% of revenues. According to his study the following are globalised industries: motor vehicles, communication equipment, electronic components including semiconductors, computers and office machinery, farm machinery, photographic equipment, engines and turbines, scientific instruments, optical goods, and industrial chemicals.

Much more common are studies that take into account the degree of industry internationalisation in the context of analysing firms. Vahlne and Nordstrom (1993), for example, examine the importance of industry internationalisation in the development of international companies. They classify industries as national, regional or global, but do not state how these categories are determined. Neither do they test their assumptions empirically.

One of the few studies to operationalise the level of industry internationalisation was done while researching employee relations in American subsidiaries (Tüselmann et al., 2008). The degree of measurement was equated with the Transnationality Index created by UNCTAD. Although this index undoubtedly refers to appropriate measures (the shares of foreign sales in total sales, foreign assets in total assets and foreign employment in total employment), it would probably prove inadequate in the majority of research as it does not include non--equity expansion.

Some of the studies are not based on quantitative research, but on case studies. Thai and Chong (2008) attempt to verify–based on four companies–whether industry structure and its characteristics (including the degree of internationalisation) affect the strategies of born-global companies in Vietnam. They find confirmation for their hypothesis that the degree of industry internationalisation determines the strategies of such companies. Asakawa and Rose (2013), on the other hand, address the issue of the low degree of internationalisation in Japa-

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and points out that the basic reference unit is a company, but he does not specify how (or to what level) the data was eventually aggregated.

[22] A detailed description of the methodology used can be found in subchapter 1.3.2.

nese service industries. Also applying the case study method, they venture to determine the causes for such an outcome. Their results are not conclusive or rather it should be stated that the whole analysis is a loose discussion on potential areas of exploration–economic policy, company resources, uncertainty of foreign markets, and embeddedness.

In recent years, one of the main directions of research is the impact of industry internationalisation on, broadly understood, company performance. Yang, Lu and Jiang (2017); using the aforementioned concepts of intra-industry trade and the work of Makhija and others (1997); analysed 1,263 Japanese companies in terms of their gains from equity expansions into foreign markets. These effects are considered within the context of the degree of industry globalisation in which these companies operated.

An analysis of the literature showed that research into the degree of industry internationalisation is neither systematised nor does it lie at the centre of interest of contemporary researchers. The proposed aims often do not distinguish between industry internationalisation and globalisation, and the measurements used in the research do not always reflect what the authors declare to measure or evaluate in their studies. The indicators of industry internationalisation applied in the research are fragmentary and rarely well-argued; and since industry internationalisation does not constitute the main focus of research, just background, measures previously proposed elsewhere are often used without a thorough consideration as to whether they are adequate for a specific study.[23]

1.5. Operationalisation of the degree of industry internationalisation

In the classical approach to the industry business cycle it is commonly acknowledged that internationalisation is a strategy used in the final phase of the cycle. Companies experiencing higher production and transaction costs and market oversaturation perceive international expansion as one of the means to survive in the industry (Karniouchina et al., 2013, p. 1012; Trudgen & Freeman, 2014). The so-called *born-global* companies seem to refute such an understanding as they are involved in global sales from the very beginning of their existence.

According to the early internationalisation concept many firms, especially SMEs, undertake internationalisation in the early stages of their functioning. There are numerous reasons behind this that can be both exogenous and en-

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[23] More information on the potential measures for the degree of industry internationalisation can be found in subchapter 1.5.

dogenous (Nowiński, 2006). The exogenous determinants are mostly caused by progressive globalisation trends:
– changes in the global market,
– deepening economic integration, including regionalisation processes,
– development of ICT,
– development of international logistic channels,
– insufficient home-market absorption.

Simultaneously, the exogenous factors are accompanied by internal changes in the companies. These involve:
– lack of the uncertainty over new market familiarity,
– lack of fear over insufficient financial resources,
– lack of barriers to acquire the necessary knowledge and competencies.

A combination of these factors can induce companies to start their foreign operations earlier than the conventional internationalisation models would have suggested. Typically, a company is recognised as *born-global* if within three years of its creation the firm has launched foreign operations that generate a minimum of 25% of total revenues.[24] The entry mode is not important, however it is assumed that the company must actively expand abroad, i.e. it needs to sell its products or services abroad. Additionally, the company is expected to undertake internationalisation in a certain number of locations. Sharma and Blomstermo (2002) suggest a minimum of three foreign destinations, while Karlsen (2003) states that the number itself is not important provided operations are undertaken in at least two continents.

The deciding moment of a company's internationalisation is crucial for the whole degree of industry internationalisation. This degree can be evaluated by certain indicators. Previous attempts to operationalise the degree of internationalisation employed two approaches to this issue, i.e. by use of certain typologies, and by the use of simple or multidimensional measures (Sommer, 2009, pp. 95-96). Typologies are descriptive and rely on classifying objects to categories created *ex ante* (cf. Bartlett & Ghoshal, 1989; Cheng & Ramaswamy, 1989; Perlmutter, 1969). These categories are supposed to reflect the differences in the internationalisation process and usually concern the following dimensions: structure, performance, managerial attitudes, strategy, resources and environment (Fischer, 2006). The other approach uses indicators that allow industries to be listed from the least to the most internationalised ones. Simple measures determine only a selected aspect of the internationalisation process, and in the case of companies this is most often foreign sales to total sales. In the case of multidimensional measures in research on company internationalisation, three indices and numerous measures based on concentration are in common use (Table 1.7).

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[24] In various empirical studies, born-global companies are defined in different ways (cf. e.g. Dominguinhos & Simões, 2004).

Table 1.7. Common measures of a company's degree internationalisation and their transferability to the industry level

Category	Indicator	Construct	Critics	Transferability to industry level
Simple	based on sales	foreign sales to total sales	– concentration upon single internationalisation dimension	yes
	based on assets	foreign assets to total assets		yes
	based on employment	foreign employment to total employment	– concentration on a single entry mode (equity vs non-equity)	yes
	based on profit (income)	foreign profit (income) to total profit (income)	– limited informative value	yes
	based on taxes	foreign taxes paid to total taxes paid		yes
	based on geographical scope	number of countries (regions)		yes, according to outcome-based[a] industry breakdown
	based on entry modes	number of foreign subsidiaries to total number of subsidiaries		yes
		number/value of FDI in total investment		yes
Indices	Transnationality Index (TNI)	– sales – employment – assets	– higher indicator value for companies from small countries – structural problems supported by factor analysis – equal importance (weights) for all components	yes
	transnational activities spread index (TSI)	– sales – employment – assets – scope (number of foreign markets)	– limited informative value – necessity of co-analysis with TNI	no–no possibility of merging outcome-based[a] and activity-based[b] industry breakdown

	degree of internationalisation scale (DOI)	– sales – employment – managerial experience – geographical dispersion of activities	– lack of theoretical and empirical verification for the indicator's structure – equal importance (weights) for all components – assumption of mutual compensation of individual components – focus on more developed entry modes – difficulties in accessing the data	no
Based on concentration level	share-related	the importance of foreign markets for the company–selected aspects	– based on simple measures – complementary character	yes
	Herfindahl index	determining the degree of industry supply concentration and evaluating the degree of activity concentration in foreign markets (according to different formulas)	– difficulties in accessing the data	no–no possibility of merging outcome-based[a] and activity-based[b] industry breakdown
	geographical entropy index			no–no possibility of merging outcome-based[a] and activity-based[b] industry breakdown
	Pangarkar index			no–no possibility of merging outcome-based[a] and activity-based[b] industry breakdown
Based on degree of country diversity		the importance of foreign markets according to selected aspects (cultural distance, political situation, etc.) for companies	– difficulties in accessing the data – subjectivity of construction – lack of model construct	no–no possibility of merging outcome-based[a] and activity-based[b] industry breakdown
Based on value chain activities		configuration of primary and supporting value activities in company's value chain in foreign markets	– difficulties in accessing the data	No

a – outcome-based breakdown means industry breakdown according to the SITC (or equivalent) standard.
b – activity-based breakdown means industry breakdown according to Nace Rev. 2 (or equivalent) standard.
Source: Based on (Bogunović, 2006; Dörrenbächer, 2000; Karasiewicz, 2013; Przybylska, 2006).

There are very few indicators that can be translated directly from a business level analysis to an industry evaluation. Most of them are one-dimensional indicators that focus on a single, selected aspect of internationalisation. Due to a lack of data and their different classifications (outcome-based or activity-based industry breakdown), it is difficult to construct a measure that would reflect the complexity of this process. In the following chapters an indicator of the author's own design will be proposed that will aim to best reflect the nature of this phenomenon. However, before this happens, it is worth having a closer look at some general remarks related to assessing the degree of internationalisation.

In analysing aspects of internationalisation, factors related to international expansion are usually grouped into three categories: *structural*, *performance* and *attitudinal* measures (Dörrenbächer, 2000; Sullivan, 1994a, 1996). Structural measures indicate an involvement in foreign markets; such as the number of markets serviced, the entry modes, the value of sales obtained on foreign markets, the number of employees in foreign subsidiaries, and the share of foreign assets to total assets. Performance measures are related to the results generated by the company in foreign locations (Elosge, Oestrele, Stein, & Hattula, 2018). Usually these are financial indicators, such as profitability broken down by location. The last group of factors is related to managerial experience in running international operations.[25] All three factor groups have been created to analyse a company's degree of internationalisation, however they are transferable to the industry level.

Another approach to internationalisation highlights that the process can acquire both outward and inward perspectives (Ratajczak-Mrozek, 2014); or as it is often viewed in the case of companies, internationalisation can be either active or passive. Passive industry internationalisation means internationalisation through exposure to foreign capital within the borders of the domestic market. This can be expressed by the number of companies with majority foreign capital operating in the domestic market, or by the value of goods and services imported into the country. Outward internationalisation is related to activities carried on outside the country, for instance through foreign sales, the number of foreign partners, the number of employees employed in foreign subsidiaries, the level of foreign direct investment or the dominant entry mode. Examples of the operationalisation variables in industry outward and inward internationalisation are presented in Table 1.8.

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[25] The evaluation of the managerial approach to internationalisation is widely criticised in the literature due to the subjectivism of the assessment and measurement problems. Heenan and Perlmutter (1979) proposed a multivariate measure that covers the complexity of the organisation, the processes of decision-making, the exercise of control, inducement principles, communication, and recruiting rules. Moreover, in the assessment of the managerial approach towards internationalisation, the number of years spent by managers in foreign branches of companies is taken into account. However, critics of this approach emphasise that the mere fact of having foreign market experience does not mean that company policy, or the attitude of the management, can be considered as directed towards foreign operations.

Table 1.8. Example operationalisation of variables in industry inward and outward internationalisation

Variable	Operationalisation
Degree of industry internationalisation–outward approach	
Sales revenue	value of goods and services sold by the industry in foreign markets compared to the value of goods and services sold by the industry in the domestic market
Intensity	number of companies making foreign transactions compared to the number of companies restrained only to the domestic market
Locations	number of internationalisation directions by companies in a given industry which generate a total of 80% of revenues from foreign operations
Entry mode	likert scale (0-1), indicating whether the industry is dominated by equity (1) or non-equity (0) expansion
Degree of industry internationalisation–inward approach	
Foreign capital	the number of companies wholly or partly (50%+) controlled by foreign equity compared to the number of companies with predominantly national capital
Imports level	value of goods and services imported by the industry for resale compared to the value of goods and services produced on the domestic market

Regardless of the approach, the degree of internationalisation can be assessed in two ways–by using simple measures, or by using complex indicators including various dimensions of the phenomenon (Ietto-Gillies, 1998; Mroczek--Dąbrowska, 2016a, pp. 97-98). In the case of the first approach, the researchers most often refer to revenues generated on foreign markets. In the other approach, various dimensions of internationalisation are compared. Sullivan (1994b, p. 173) claims that multi-item measurement scales are superior to single-item scales because of the "capacity to reduce random and systematic error, control for confounds, and estimate the reliability of measurement". On the one hand, such measures allow for a more in-depth analysis of the problem; however, on the other, they create a number of interpretative ambiguities (Przybylska, 2006):

– including financial flows in the multi-item indicators may disturb the real picture of revenues generated in foreign markets since companies often employ transfer pricing and other tax evasion tools,
– while constructing a multi-item scale there is a problem of how to adjust the weights of its components,
– multi-item indicators are difficult to interpret; two industries may exhibit the same degree of internationalisation, but this does not mean that their structure is similar since the value of the indicators can be shaped by various factors,
– multi-item scales suggests that its components are interchangeable, i.e. the lower level of one element can be "made-up" by another,

– in the case of some components there is a high level of interpretive subjectivism–e.g. it is difficult to assess different "combinations" of entry modes–meaning: are industries that use a variety of entry modes more internationalised or is it those with the highest share of foreign direct investment?

Ietto-Gillies (2009, p. 67) postulates that no indicator fits all research, but it depends on the context of the study which should directly refer to the following (Figure 1.8):
– unit of analysis (micro, meso, macro),
– dimension (depth, width and concentration),
– complexity of study (one-item vs. multi-item),
– choice of normalizer (subgroup studies),
– construct of indicator.

Perspectives on internationalisation			
Aggregation level	Internationalisation modes	Value chain international configuration	Elements
Firm (large and/ or SMEs) Industry Macroeconomy	International trade FDI (greenfield, M&As) In-house vs. outsourcing	Backward or forward Horizontal	Performance Behaviour Structure Governance

International variable as % of domestic or total	With or without normalisation	Herfindhal indices Gravitation indices
Degree of intensity	Degree of geographic intensity	Degree of geographic concentration
Dimensions of the degree of internationalisation		

Indices	Indices Simple (uni-variable) Composite (multi-variable) Complex (multi-dimension)	Normalizer
Construction of indices: strategic choices		

Figure 1.8. Interdependence of degree of internationalisation measures
Source: (Ietto-Gillies, 2009, as cited in Wach, 2016).

As can be seen, a multitude of approaches to constructing internationalisation measures creates decision problems. Makhija and others (1997, p. 681) point out that regardless of the construct itself, the measure must be recognised by the following characteristics:

– it should accurately reflect the structure of a given industry, i.e. it must take into account all (or at least the majority) of the companies operating within the industry, and not just its most important players,
– it should clearly indicate industries that have significant international connections,
– it should reflect value added creation outside the country.

Bearing in mind the abovementioned limitations, it is difficult to unambiguously determine whether, in assessing the degree of industry internationalisation, it is more advisable to use simple, composite or complex measures. In the literature,[26] a trend can usually be noticed that in studies focusing strictly on the degree of internationalisation, reference should be made to multivariate measures, and in research where this degree is only one of the determinants of another phenomenon, to uni-variable measures. In this study the degree of industry internationalisation remains the main aspect of the analysis, hence in further considerations a composite measure that can be applied to mesoeconomic analysis will be proposed.

1.5.1. Degree of industry internationalisation–outward approach

Companies operating in an industry frequently decide to actively venture into foreign markets. Therefore, one can attempt to analyse the degree of internationalisation of a given industry. By analogy to the company level, the industry degree of internationalisation can be presented in the form of simple, composite or complex indices. Depending on the objectives of a given study, the chosen indicators will depict an industry's performance, structure or strategic choices made in foreign markets.

Analysing industry structure, the degree of internationalisation is defined in the simplest terms as the number of companies undertaking foreign expansion divided by the total number of companies in the industry, and is expressed by the following formula:

$$IID_e = \frac{n_i}{N} \cdot 100,$$

where:
IID_e – industry internationalisation degree,
n_i – the number of companies in the industry undertaking internationalisation,
N – total number of companies in the industry.

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[26] The degree of internationalisation in the literature is usually aligned with transnational corporations or with companies in general. Subchapter 1.4 presents a few studies where the unit of analysis refers to an industry. Hence the observations evoked here refer to company-level research.

Such an approach to defining the degree of internationalisation only indicates the number of companies actively taking up foreign activities. This indicator, however, does not expose the complexity of such ventures. When the research goal focuses on the results of internationalisation, the degree of internationalisation may be based, as in the case of companies, on revenue (profits) achieved abroad. The indicator then follows this formula:

$$IID_e = \frac{R_i}{R} \cdot 100,$$

where:
   IID_e – degree of industry outward internationalisation,
   R_i – industry revenue generated abroad,
   R – total industry revenue.

Simple internationalisation indicators can be created in large numbers. Translating the measures applied at company level one can also use the structure of fixed assets, the number (or value) of foreign direct investments, investment revenues, the number of employees in foreign subsidiaries, etc. Similarly, when dealing with the breadth of internationalisation, one can focus on the number of foreign location where the key players are present, indexes of geographical concentration, etc. One needs to remember that a single company ceases to be a reference unit, and a group of companies becomes such.

Bearing in mind the limitations of using composite and complex measures, one can try to define the degree of internationalisation by combining some of the most important aspects: internationalisation intensity, geographical scope and complexity level. In this sense, the degree of industry internationalisation would be a function of these dimensions:

$$IID = f(N, R, G, EM),$$

where:
   IID_e – degree of industry outward internationalisation,
   N – industry internationalisation structure variable,
   R – industry internationalisation intensity variable,
   G – industry geographical scope of internationalisation variable,
   EM – industry dominant entry mode variable.

The number of companies of an industry undertaking internationalisation can be expressed in absolute and relative terms (industry internationalisation structure). The absolute value holds little information, since it says nothing about

the industry's size or the industry's structure, i.e. it does not enable companies undertaking international ventures to be compared with those that do not. It is therefore more advisable to implement relative measures.

The number of companies involved in international trade does not have to translate into the industry's financial performance in foreign markets (internationalisation intensity). Numerous companies may expand abroad; however, their sales revenues in foreign markets can still be marginal. Thus, another important aspect of internationalisation that should be taken into consideration is international trade revenues, normally understood as sales revenues gained in foreign markets compared to total industry sales.

Geographical scope refers to the number of foreign locations the companies of a particular industry were able to reach. This value can only be expressed as a proxy since obtaining an exact value seems improbable. The measure can be given as e.g. the arithmetic mean or the median. This particular aspect is often brought up when estimating a company's level of internationalisation.

Companies may expand abroad using various entry modes–either equity or non-equity ones. Among the non-equity entry modes one can list direct and indirect exports, licensing, franchising, subcontracting, etc. Among the equity ones foreign direct investments and joint ventures are mentioned. Equity entry modes require the engagement of company resources, widely understood. If one were to venture to transpose this aspect to the industry level, one could express it as the number of companies investing capital in foreign markets (choosing equity--modes), compared to the total number of companies undertaking internationalisation.

Due to the fact that these variables are presented in different scales, their comparison and synthesis require normalisation and rescaling. Then the indicator can be expressed as follows:

$$IID_e = w_1 \cdot N + w_2 \cdot R + w_3 \cdot G + w_4 \cdot EM,$$

where:
IID_e – external industry internationalisation degree,
N – industry internationalisation intensity variable,
R – industry internationalisation performance variable,
G – industry geographical scope of internationalisation variable,
EM – industry dominant entry mode variable.
w_1, w_2, w_3, w_4 – weights of variables.

The weights in the formula can be assigned using statistical methods or arbitrarily, provided that they reflect the significance of the variables in the phenomenon studied.

1.5.2. Degree of industry internationalisation–inward approach

The company internationalisation process, and thus indirectly the industry internationalisation process, does not have to take an active form. It can also happen when companies and industries are exposed to passive internationalisation, i.e. when goods and services flow into their home country. Therefore, it is not only necessary to analyse active engagement in foreign markets, but also to verify how foreign capital changes the rules of the game in the internal market.

Similarly to remarks included in subchapter 1.5.1, it is possible to either use single indicators or create composite/complex measures that illustrate foreign companies' operations in a home-based industry. After an in-depth literature study it can be suggested that the measures encompass three dimensions: foreign direct investment, imports, and foreign sales in the home market. A foreign company is understood as a firm whose shares are in majority 50%+ controlled by foreign capital. The intensity of foreign penetration can be expressed as the number of foreign companies compared to the total number of companies registered in the industry. Moreover, another aspect can be described as the number of importers compared to the total number of companies operating in the industry. This variable illustrates the home market dependence on outside suppliers. The last dimension is the share of foreign companies in home market sales. They can be expressed by the sales revenue (profit) of those companies compared to total sales revenues (profits) of the industry in the home market.

Again, as single components are presented in different scales, their comparison and synthesis requires normalisation and rescaling. As a result the formula is as follows:

$$IID_i = w_1 \cdot \text{FDI} + w_2 \cdot \text{I} + w_3 \cdot SR,$$

where:

IID_i – degree of industry inward internationalisation,
FDI – foreign direct investment variable,
I – imports variable,
SR – foreign sales variable,
w_1, w_2, w_3 – weights of variables.

1.6. Degree of industry internationalisation and level of industry development

By identifying the determinants and estimating the degree of internationalisation of some units (companies, industries, regions or even whole economies), the question arises whether this degree is significant as far as their development is concerned. The diagnosis of the degree of internationalisation, interesting as it is, raises no deeper reflection if it does not directly affect the developmental potential of the entity (Brush, Bromiley & Hendricks, 1999; Riahi-Belkaoui, 1998; Sullivan, 1994a). This is due to the fact that the observed relationship between the degree of internationalisation and performance, broadly understood, does not in most cases display a linear character but takes the shape of a "U" curve (or a reversed "U" curve), a J-shaped curve or a horizontal S-shaped curve. Therefore, with the initial increase in the intensity of foreign activities, positive effects are not always noticeable. Similarly, when reaching high degree of internationalisation, the complexity of operations may also hinder a company's performance.[27] However, as most studies do indicate positive internationalisation effects, most researchers point to the following (Bernard & Jensen, 2004; Melitz, 2003):
– increase in productivity,
– increase in professional qualifications of the employees,
– increase in the employees' remuneration,
– increase in innovativeness (through *learning-by-exporting* effect),
– decrease in the company's operating risk,
– overall increase in company's competitive capabilities.

Yang, Lu and Jiang (2017) indicate that the degree of industry internationalisation directly influences a company's performance by shaping the cost curve and learning curve effects (Figure 1.9). They assume that in globalised industries the learning effects appear faster and therefore the results obtained in the foreign markets are better. Yang, Lu and Jiang (2017) also highlight that this relationships takes a reversed "U" shape; however, in multidomestic industries its shape is flattened compared to globalised industries.

Company decisions influence not only a company's development potential but they also affect the industry it operates in. McElroy, Creamer and Workman (1985) indicate that the deepening of the internationalisation process by the

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[27] It is difficult to determine the degree of internationalisation threshold for a company to remain effective. Riahi-Belkaoui (1998) suggests that companies start gaining effectiveness at a level of 14% and start losing it past 47%. Geringer, Beamish and daCosta (1989) propose a different division where companies achieve their highest efficiency at a degree of internationalisation between 60-80%. Sullivan (1994b) notes, however, that these thresholds are flexible and depend on many additional criteria, including mode of company ownership.

Figure content:

A, B, C: indicate benefits, costs, and overall effects at a low level of industry globalization

A', B', C': indicate benefits, costs, and overall effects at a high level of industry globalization

Benefits from learning curve effects

Corporate performance

Cost from the time compression diseconomies

Net effect of the speed of FDI expansions

Level of the speed of FDI expansions

B' B A' A C' C

Figure 1.9. Moderation effects of industry globalisation on the curvilinear relationship between speed of FDI expansion and company performance

Source: (Yang, Lu, & Jiang, 2017, p. 78).

largest car manufacturers in the United States between 1979 and 1984 caused, among other things, the following:

– rationalisation of production costs in the whole industry,
– increased productivity of all industry players,
– increased competitive pressure in the industry caused by the inflow of foreign investors (expansion of the existing network),
– increased product innovation in the whole industry.

These remarks are also corroborated in a study by Elango (2010), who analyses manufacturing industries in the United States and who indicates significant differences between highly internationalised industries (*global*) and those much less internationalised (*multidomestic*). A higher degree of internationalisation translates into higher research and development spending, higher industry pressure and concentration, higher level of imports, and also higher remuneration. Zou and Cavusgil (1996, pp. 62-64) also prove that the degree of industry globalisation affects the strategies companies adopt in foreign markets. They suggest that companies in highly internationalised industries aim for the following:

- early internationalisation,
- simultaneous internationalisation in several markets,
- dispersion of foreign expansion,
- focus on the cooperative form of internationalisation,
- high coordination and control over activities undertaken,
- standardization of marketing activities.

1.7. The role of the state in shaping the degree of industry internationalisation

One could assume that the processes of globalisation and internationalisation lead to a reduction of the role of the state in shaping a country's competitiveness. However, what is changing is the scope and tools of the policies in use and not the importance of the state in creating policies (Gorynia, 2006, p. 135). The main component of national economics is macroeconomic policy; which includes, among other things, monetary, fiscal, and employment policies. However, many countries also use supporting instruments aimed at developing competitiveness, broadly understood. Increased competitiveness can take place by selectively supporting certain activities (enclave model–i.e. exports to foreign markets or direct foreign investments), or in a holistic way (integral model). However, there are many arguments for using an integral approach, and avoiding special treatment for selected parts of the economy (Gorynia, 2006, p. 132).

Despite the general agreement that industrial policies aimed at the selective support of industries do not ultimately increase the efficiency and competitiveness of the economy, many countries still apply them to a greater or lesser extent. One of the most commonly cited arguments in favour of such policy is the fact that governmental intervention gives desirable results faster than the market itself. Although this can prove true, there are specific reasons why selective support can be inefficient (Gorynia, 1995, pp. 147-149):

- by implementing selective support, it is assumed that the government is fully rational, i.e. the government possesses all relevant information on the industries (*picking the winners*),
- it can be questioned whether the government is to be *the* party responsible for optimal resource allocation (*government failure*),
- obtaining relevant information on the industries is not costless and thus the overall cost of creating the selective support tools can be greater than the effects obtained,

– industries are interrelated and thus supporting only specific ones may lead to disturbing the whole economy structure, which can be an unwelcome side effect of the selective support.

Nonetheless, one of the tools commonly used for such support is the promotion of the export sector. This means that selected industries receive financial and non-financial incentives as well as assistance in seeking sales for their products/services in foreign markets.[28] The ultimate choice as to which industries to support differs among individual countries, but a certain consensus can be drawn that most often these are the following (Ćwikliński, 2004):

– *high-tech* industries,
– high value-added per employee industries,
– industries suppling production input,
– prospective industries, i.e. with high potential for future development,
– industries supported by other countries (principle "by analogy"),
– key national security industries.

The industrial policy, including selective support, has been historically popular among the developing economies or economies in transition. One of the main reasons for its implementation is–commonly observed in such situation–underdeveloped state of private sector. The policy should lead to the creation of sound institutional framework which in time should allow for gradual withdrawal of selective support tools. However, as evidence shows, substituting those tools with a holistic approach frequently proves problematic or simply inconvenient.

Although the European Union declares the use of a so-called horizontal industrial policy, based on the principle of *equal footing*,[29] at the same time it allows the selective support of industries through some of its programmes. For instance, under the Smart Growth Operational Programme 2014-2020 co-financed by the European Union, it is possible to help selected industries to expand into non-EU markets.[30] These programmes relate to the enclave model and not the integral model, i.e. they do not support increasing competitiveness using the same tools offered to all market participants, but differentiate between the beneficiaries and their support instruments. However, liberal-institutional industrial policy refers to the integral model concept, where meso-systems–including industries–are all treated in the same way (Gorynia, 2006, p. 133). Under this policy, the follow-

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[28] Since one of the main objections to selective support tools is the fact that they create artificial sales for non-competitive products/services, current support instruments (especially those offered within the European Union) require proof that the company has an outstanding product/service in relation to their market rivals. However, the criteria used in the selection of such products/services remain questionable.

[29] The principle of equal treatment for all entities and industries.

[30] This programme is only aimed at high-tech industries. More about the programme itself, as well as its impact on the degree of industry internationalisation, can be found in subchapter 5.7.

ing postulates are mentioned: developing innovation, increasing infrastructure investments, diffusing information, and diversification of economic risk. As a consequence these activities may translate into genuine support, e.g. in terms of intensifying the internationalisation scope of industries and companies, but without prior indication of the groups at which these tools should be aimed. In terms of accelerating internationalisation this policy should strive for the following (Gorynia, 2006, pp. 133-134):

– eliminating barriers to the development of exports,
– supporting investment regardless of where the capital comes from,
– developing safeguarding tools against unfair competition.

Summary

The concept of internationalisation is most often related to processes where firms constitute the subject of analysis. Companies can accelerate their development by entering new markets, learn by engaging in international exchange, or even increase their competitiveness by being exposed to international competition. Some studies acknowledge that these processes are also shaped by the conditions set by the industry. However, an industry should be considered more than just the background for firm-level analysis. The industry itself is also exposed to internationalisation processes which is worth analysing, and thus this can and should be done in terms of its international engagement.

It is commonly accepted that the more internationalised an industry is, the more visible the benefits of its existence are. A high degree of internationalisation translates into better performing industry members, as well as the development of the region or even the whole economy. Bearing this in mind, it is worth examining how internationalised Polish industries are and what influences their degree of internationalisation.

2. The degree of industry internationalisation– conceptual framework

Various studies have proved that in the case of companies the ability and willingness to internationalise depends, among other things, on the local context in which they operate. This means that the quality of available infrastructure, the quality of the workforce, the efficiency of the public sector, as well as many other factors may translate into an intensified effort to boost internationalisation (Dunning, 1998; Limao & Venables, 2001; Manova, 2013; Melitz, 2003). Understanding the relationship between the degree of internationalisation and its determinants is not only an interesting research question, but it also entails important normative implications.

In the case of the degree of industry internationalisation, literature analysis does not point to a definite answer to the question as to which conceptual approach is the most appropriate in the study of internationalisation determinants. Therefore, it is necessary to find analogies in the research on these processes that can be used at the micro- and macroeconomic level. The interdependence of analytical layers enables it to be assumed that some of the determinants that significantly influence a company's willingness to expand abroad may in a similar way affect the internationalisation of industries.

2.1. Company internationalisation determinants from a mesoeconomic perspective

The internationalisation of activities can, as indicated in Chapter One, be considered at various levels of analysis. Although the focus in this work is on the mesoeconomic level, the majority of internationalisation theories refer either to the macro or micro perspectives (Karasiewicz, 2013, p. 109). At the macroeconomic level, these theories provide answers to questions about the reasons for economic specialisation and the scope of international trade. At the microeconomic level, however, they serve to explain some basic questions related to a company's functioning (Karasiewicz, 2013, pp. 109-110):

- motives for the company's internationalisation,
- business interactions in the internationalisation process,
- determinants of the internationalisation process,
- internationalisation paths (directions of expansion and entry modes),
- competitive advantages of companies in internationalisation processes,
- the impact of the internationalisation process on the company's position.

Theories about industry draw on theories about firms that are focused on studying the behaviour patterns of a single company and–to a lesser extent–they draw on macro-level theories which are devoted to the processes driving the economy. Although these theories partially overlap, it is especially important to highlight the differences in these paradigms (Gorynia, Jankowska, & Maślak, 2000, pp. 44-45). The general distinctions result primarily from the research subject, its scope and approach (Table 2.1).

Table 2.1. Interdependencies between industry theories and firm, and macro-level theories

Criteria	Comments
Research subject	an industry has features that are not reducible to the micro level or aggregable to the macro level (e.g. concentration, entry and exit barriers)
Overlapping	due to the complexity of research units and the way they function in interrelated subsystems, it is only necessary to analyse processes related to a given industry, and thus simple aggregation (micro to meso) of data or their reduction (macro to meso) is not always possible
Theory character	firm theory is cognitive, while industry and macroeconomic theories allow for the formulation of directives in relation to state policies, i.e. they contain normative elements

Source: Based on (Gorynia et al., 2000, pp. 44-45).

According to the industrial organisation, an industry can be perceived either in the set approach or systemic approach. In the first perspective an industry encompasses individual companies that act autonomously according to their preferences. The industry development results only from companies' interactions on the market. The systemic approach on the other hand takes industry growth beyond firm interactions. Here companies are placed within a formal structure of institutions and norms that regulate relations among industry members. These structures can both restrict or sustain industry expansion. In practice however, implementing these approaches in industry studies is mostly deemed unfeasible since most of economic concepts does not apply such methodical distinctions.

Establishing what determines industry internationalisation turns the attention to one more aspect of industry perception–settling whether industry members' behaviour stems wholly from their environmental circumstances or is solemnly

autonomous. In most cases however, company's strategy can be determined by both internal and external factors. Therefore, such an approach will be adopted in the reminder of the chapter.

To the best of the author's knowledge, the problem of what determines the degree of internationalisation of an industry has not yet been discussed. For this reason it is difficult to deduce from a literature overview what may affect this process. In such cases the starting point for creating a research scheme is very often reference to similar research that has been conducted in terms of other analysis levels. And so–bearing in mind the limitations imposed by the nature of the researched entities–in studying industries one can take certain guidelines from the theory of the firm (Table 2.2).

Table 2.2. Selected determinants of the degree of company internationalisation

Internationalisation degree factors	Theoretical background	Assumptions	Transferability to industry level	Pull/push factor type
Resources Capabilities Ability to transfer knowledge Ability to absorb knowledge	– resource-based theory – behavioural theory – evolutionary theory	– determinism – static and dynamic models	no, unique for a single company	push/pull
Experience and knowledge of the management	– behavioural theory – strategic management – innovation theories – theories on diffusion of innovations	– bounded rationality – opportunism – static and dynamic models	no, unique for a single company	push
Formal and informal relationships within the network (*embeddedness*)	– behavioural theory – relationship marketing – social exchange theory – resource-based theory – industrial organisation – transaction costs theory	– dynamic model based on relations	no, unique for a single company	push/pull

Table 2.2 – cont.

Internationalisation degree factors	Theoretical background	Assumptions	Transferability to industry level	Pull/push factor type
Product type	– innovation theories – theories on diffusion of innovations – behavioural theory – strategic management	– bounded rationality – opportunism – static and dynamic models	yes, possible to average at the industry level	push
Company's size			yes, aggregable to industry level	
Competition				
Domestic market				
Governmental subsidies				
Trade barriers			yes, possible to average for product groups and services	pull/push
Production costs	– models of imperfect competition	– bounded rationality – static model	yes, possible to average at the industry level	push
Marketing costs				
Control costs				
Tax differentiation			yes, possible to average for country groups	pull
Technology innovation degree	– innovation theories – models of imperfect competition	– bounded rationality – opportunism – static model	yes, aggregable to industry level	push
Competitor's strategic behaviour	– models of imperfect competition – models of oligopoly	– bounded rationality – opportunism – dynamic model	no, not measurable at industry level	push
Attractiveness of foreign markets	– traditional location theories	– bounded rationality – static model	yes, but difficult to measure at industry level	pull
Level of transaction costs/ Transaction specifics	– transaction costs theory	– bounded rationality – opportunism – static model	yes, aggregable to industry level	push

Source: Based on (Karasiewicz, 2013, pp. 162-169; Nowiński & Nowara, 2011, p. 30).

As Table 2.2 indicates, determinants of the degree of internationalisation can be found in many theoretical approaches. Their number enables the internationalisation process to be viewed from a variety of perspectives–from factors determining the specific situation of the company itself, its industrial context, up

to factors relating to the overall economic indices. Before turning to separate groups of determinants of the degree of a company's internationalisation–and the (in)ability to transpose them to the industry level–it is first worth mentioning one more classification of these factors. It can be presumed that these determinants can be grouped as either *pull factors*, i.e. attracting new entries; or *push factors*, i.e. making companies search for new markets.[31] The pull factors, otherwise known as the proactive ones, are directly linked to the markets which companies decide to enter. These markets offer favourable conditions that stimulate companies' engagement in the given market(s). In turn, push factors, otherwise known as the reactive ones, work in the opposite way and relate to the home country. Unfavourable conditions in the domestic market may force companies to look for alternative solutions abroad.

2.1.1. Resource-based determinants of the degree of internationalisation

In the case of a company's internationalisation one of the main concepts useful in seeking the answers on deepening a firm's degree of internationalisation are models referring to resource-based views. The conceptual grounds for these models constitute evolutionary approaches and behavioural theories. A firm is understood as a bundle of resources that are transformed into skills (capabilities). Depending on the nature of these resources and capabilities, they can help a company gain a comparative advantage. If these are rare, inimitable, valuable and non-substitutable they can bring the company considerable gains from its engagement abroad. Such a combination of company capabilities and resources will lead to an increased degree of internationalisation in terms of both the width and depth of expansion. With the right configuration of resources a company can gain more from its geographical coverage, entry modes (hierarchical entry preferences) and scale of operations (Zucchella & Palamara, 2007).

The resources and capabilities of individual companies are however features unique to them. The fact that a certain company has, or rather applies, certain resources and knowledge does not indicate that other industry members will follow suit. The resource-based view is predicated on the assumption that companies strive to gain a competitive advantage enabling them to succeed in foreign markets, but resources and capabilities are not recognised as company assets in balance sheets. Also, one of the most distinguishable of company resources is

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[31] Moreover, aside from these categories one can encounter *chance factors*, i.e. factors related to the exploitation of a certain chance appearing in the environment; and *entrepreneurial factors*, i.e. factors related to the company's pursuit of development, where the key stage of a company's development is its internationalisation (Belniak, 2015; Wach, 2012).

human capital, which is not assessable at industry level. Capabilities are very frequently equated to a company's competitive edge, so reducing it to some average industry value would mean it losing all informational value. Therefore, although resources describe the internationalisation process of a company quite well, they cannot be transposed into an industry level variable.

2.1.2. Industry network embeddedness as a conceptual basis for degree of internationalisation research

Networking is a concept describing the state reached by a certain entity that denotes the network connections binding it to other entities (Szymura-Tyc, 2015, p. 59). Entities interact with other members of the network and regulate the way their interactions take place (Ebers & Grandori, 2001, p. 266). There is a common agreement that participating in a network, or rather being embedded in it, means entities learn faster, share experiences, and thus, expand faster. Studying a network's structure and character requires invoking other theoretical concepts, including the transaction costs theory and theory of social exchange (Czakon, 2012; Johanson & Mattsson, 1987; Małys, 2013). The transaction costs concept raises questions over the nature of the relationship between network members. According to Williamson (1985) entities may choose between market regulations, bi- or multilateral regulations, and internalization. The variety of links creates a hybrid structure of dependencies significantly different from the classical regulatory mechanisms (Szymura-Tyc, 2015, p. 67). The theory of social exchange expands the perception of a network as a coordinated system in the value chain. Such a perspective recognises the significance of company's embeddedness in a network (Granovetter, 1985).

A network is a concept that coincides with, but is still different from, the concept of an industry. It is true that members of a certain industry enter into mutual interactions, but their relations are competitive or at best coopetitive in nature. Marshall's definition of industry (1972)–which remains the reference framework for this study–does not include relationships between members within the industry value chain, i.e. relations with suppliers and customers. Thus, the network and the industry may have some common ties but not all of them (Figure 2.1).

Therefore, the question arises whether the concept of networking is an appropriate basis for the analysis of the processes taking place within an industry. The answer to this question is neither simple nor unambiguous. An analysis of networking requires deepening the study on the relationships between network members who remain in close proximity. These interactions are usually assessed in the dimension of actions, resources and the relationships between the members (Håkansson, Ford, Gadde, Snehota, & Waluszewski, 2009). Considering
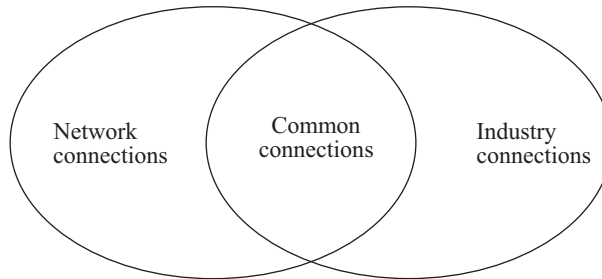
Figure 2.1. Interdependencies between industries and networks

such interrelations when the research unit becomes an industry, i.e. a group of heterogeneous entities, raises problems. Simplifying the analysis to the case of a single company focuses on assessing a company's role and status for the processes taking place in the network, as well as the role of the network in the company's development, broadly understood (Daszkiewicz, 2017, pp. 21-23). In the case of industry, such an analysis could have a twofold aim: (1) a comprehensive analysis of the links between industry players; or (2) an analysis of the role and significance of an industry in the various relationships between different networks. In both cases, such studies are extremely complex and problematic, as it is improbable that the entities belonging to the same industry are homogeneous. As they vary so much, the overall assessment of these relationships would rarely give conclusive results.

In a networking analysis, certain measures are used to determine whether and to what extent a given entity is interdependent from other entities in its surroundings. Referring to the transaction costs approach and to the theory of social exchange, the most commonly considered aspects are inter-organisational relations, types of cooperation, forms of coordinating value chain activities, and business relations (Szymura-Tyc, 2015, p. 172). By applying a reformulation these measures can be transposed from company level to industry level. This requires determining the intensity of links between competitors, the dominant forms of cooperation between them, their business relations, etc. Although such a procedure is feasible theoretically, in practice an attempt to determine these relationships for all industry members would at the very least be cumbersome, especially considering large industries in terms of the companies registered. Doubts also arise regarding the issue of focusing only on the dominant relationship form. Although there is evidence for a positive relationship between the degree of networking and a company's degree of internationalisation, the attempt to transfer these considerations to the mesoeconomic level is, according to the author, a venture too difficult to accomplish.

2.1.3. Behavioural internationalisation models

Another group of factors determining a company's degree of internationalisation are factors relating to innovation models and strategic planning. Innovation means a sequence of activities leading to the creation of new or improved products/services, technological processes or organisation changes. According to Schumpeter (1960) an innovation is understood as (1) the creation of a new product/service; (2) the implementation of a new technology; (3) the opening of a new market; (4) the acquisition of new resources; (5) the reorganisation of an industry structure. Among the innovation-based models one can also find behavioural theories and concepts such as the diffusion of innovation (Rogers, 1962).

Apart from innovation-based models, the strategic planning approach is also based on behavioural theories. The internationalisation process, including the degree of a company's engagement in foreign operations, here results from the long-term strategic plan which is normally preceded by a detailed analysis of the target market, possible entry modes, as well as the preparation and implementation of a marketing plan (Whitelock, 2002). The degree of internationalisation is derived from the goals that the company intends to pursue in individual markets.

Innovation-based models along with the strategic planning perspective assume that internationalisation is a gradual process; therefore reaching new destinations takes time, and so does increasing the degree of internationalisation. The main factors determining the pace of internationalisation can be divided into external and internal factors. Among the most frequently named exogenous factors are the following: level of industry rivalry, size of domestic market, governmental aid and trade barriers. Among the endogenous factors there are for example product type, company size and technology in use.

A part of these factors can not only refer to the internationalisation process of a company but can also determine the degree of internationalisation in an industry.[32] The abovementioned exogenous determinants refer in truth to the environmental conditions of the industry in the domestic country. The level of industry rivalry, expressed for instance by the degree of industry concentration, determines an industry's structure and thus facilitates the understanding of the strategies applied locally. The basis for forecasting the possible development opportunities for an industry in a given country is information on local demand and the trends that this demand is subject to. Together, these factors can determine whether it is worth investing in the domestic market, or whether it will be necessary for companies to either look for demand abroad or switch industries. These

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[32] It is assumed here that the decision of a single company has the power to determine the decisions of other companies, which in effect changes the way the entire industry functions.

decisions can be influenced by government, which–through targeted subsidies–can alter the way companies project their existence in an industry. All these factors are the so-called *push factors*–unfavourable local market conditions forcing companies to seek internationalisation as a remedy for further development. Slightly different is the effect trade barriers may have on foreign expansion. Depending on whether one considers export or import barriers, these restrictions may cause either a growth or a decline in the level of internationalisation.

The type of product, its technological advancement and the size of the company are also commonly known as determinants of the degree of internationalisation. Again, these factors can be transposed to the meso level. Within an industry, products or services usually have a similar level of technological advancement, which is reflected in the classifications of international statistical institutions. The size of an industry may, for instance, be determined by the number of active companies within the industry and its structure, i.e. the distribution of companies by size.

However, it should be noted that along with the change in research perspective, the perception of these factors also changes–those factors that were previously perceived as external ones do not necessarily remain exogenous. For example, in the case of a company's internationalisation, intra-industry competition is an exogenous factor since it describes its immediate environment. In the case of an industry, however, it transforms into an internal characteristic as it no longer represents the context in which the subject under study is embedded.

2.1.4. New institutional economics in the study of the internationalisation process

Developing countries, including so-called *catching up* and *transition* countries, have become a testing ground for numerous conceptual frameworks (Cieślik & Kaciak, 2009). This interest results from the possibility of observing significant changes occurring in such economies, which facilitates the assessment of the impact the institutional environment has on the processes taking place in the country. Hence, the new institutional economy, with particular emphasis on the transaction costs concept, is of considerable interest.

At the same time, economists express concerns that the theories which emerged during years of studying developed economies do not necessarily have to be reflected in developing ones (Bruton, Ahlstrom, & Obłój, 2008; Cieślik & Kaciak, 2009; Tsui, 2004). One of the issues most often raised is the possibility of an assumption mismatch (Zahra, 2007), which can cause the results of empirical research to be inconclusive. In the case of the assumptions of new institutional economics, however, this is a dubious objection since the behavioural

foundations of this theory are universal and do not depend on the development level of individual economies.

It is widely believed that the level of transaction costs in an economy depends directly on the economic development of the country (North, 1981; Piątek, 2015). The more local is the trade, the lower are the transaction costs due to the lack of any need for a third party (institution) to regulate the contract execution. Along with an increase in products/services complexity and the broadening of the geographical scope of trade, the uncertainty and thus the level of transaction costs also increase. In order to minimize costs it becomes necessary to introduce institutions, broadly understood, that can ensure the stability and legal validity of the transactions. Although research on the role institutions play as economic regulators is still ongoing, the recognition of these dependencies have become a starting point to analyse how the level of transaction costs and the effectiveness of institutional operations affect a company's willingness to undertake foreign expansion.

Of particular importance is the analysis of internationalisation processes, which were almost non-existent before the transformation. For example, in Poland before 1989 there were only 767 companies involved in export activities (Cieślik & Kaciak, 2009). Along with the transition from a centrally planned economy to a free market economy, their number increased significantly, as did the foreign direct investment in-flow. This gave rise to a natural question as to how the institutional context influences the expansion decisions of companies. Did the earlier lack of a stabilised institutional environment[33] and the birth of a new order reduce contractual uncertainty and the asymmetry of information? Did the new institutional order reduce transaction costs in the economy? These and similar questions have contributed to the popularisation of new institutional economics as the theoretical framework for research on internationalisation, from both the macro- and microeconomic perspectives.

Since the 1970s, within the new institutional economics mainstream, the concept most frequently invoked in internationalisation research has been the transaction cost theory. Santos, Barandas and Martins (2015) analysing publications between 1970 and 2010 from six leading journals[34] on international business,

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[33] The institutional environment is understood very broadly. It covers both the normative, cultural and regulatory aspects (Grosse & Trevino, 2005). The normative aspect concerns the establishment of rules for the functioning and interdependence of institutions, as well as setting the objectives for the whole system. The cultural aspect reflects the specificity of the internal processes, rules and principles characteristic for a given community. The regulatory aspect, on the other hand, includes the creation of specific rules and legislation, as well as sanctions enforced in the event of violation of the rules established.

[34] *International Business Review*, *Asia Pacific Journal of Management*, *Journal of International Business Studies*, *Management International Review*, *Journal of International Management*, *Journal of World Business*.

show that the transaction cost theory was used in about 23% of all publications on the company internationalisation process. Similarly, an analysis of the institutional environment appeared in about 8% of publications. These two aspects are closely interlinked with each other, since a commonly accepted thesis exists that the more frequent the changes in less-stable institutions, the higher are the transaction costs (Meyer, 2001). The interdependence between transaction costs and internationalisation is mainly examined in three dimensions:

– choosing the optimal entry mode (e.g. Anderson & Gatignon, 1986; Brouthers, 2013; Gatignon & Anderson, 1988; Hennart, 1988; Meyer & Peng, 2001),
– choosing the target country (e.g. Jones & Butler, 1988; Tatoglu & Glaister, 1998),
– intensifying the scope of internationalisation[35] (e.g. Jones & Butler, 1988; Jones & Hill, 1988; Noteboom, 1993).

2.1.4.1. The agency theory and the degree of internationalisation

The agency theory presumes that in a company one encounters a *principal* who employs (or rents) an *agent* to run the company. By means of a contract the agent and the principal set the goals and expectations to be met in the development of the company. Usually, there are situations in which the short-term (agent's) goals differ from long-term (principal's) goals.

The agency theory is also used in research on the internationalisation process of companies. Decisions of the agent are very often listed as potential determinants of the pace, mode and intensity of foreign activities (*agent-specific determinants*). For instance, Bala Subrahmanya (2014) examines how the agent's age, experience and preferences influence the internationalisation degree of Hindu small and medium-sized companies between 2010 and 2011. These observations confirm that the agent's behaviour has a significant impact on a company's foreign operations.

2.1.4.2. Transaction cost theory and the degree of internationalisation

The empirical studies carried out so far focus primarily on determining the optimal scale of production and trade. As Chart 2.1 indicates, with an increase in production, transaction costs decrease, but this only happens to a certain level of market share (Q3). Although further production increases bring further reductions in total average costs (production costs + transaction costs), the transaction costs themselves start to increase again. Since reducing transaction costs in the local market is no longer possible, it is necessary to look for recipients in foreign markets.

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[35] Most empirical studies as internationalisation degree recognise a simple indicator of the share of export revenues to the general level of sales revenues.

Cost

ATC

ATRC

APC

Q_3 Q_1 Q_2 Market share
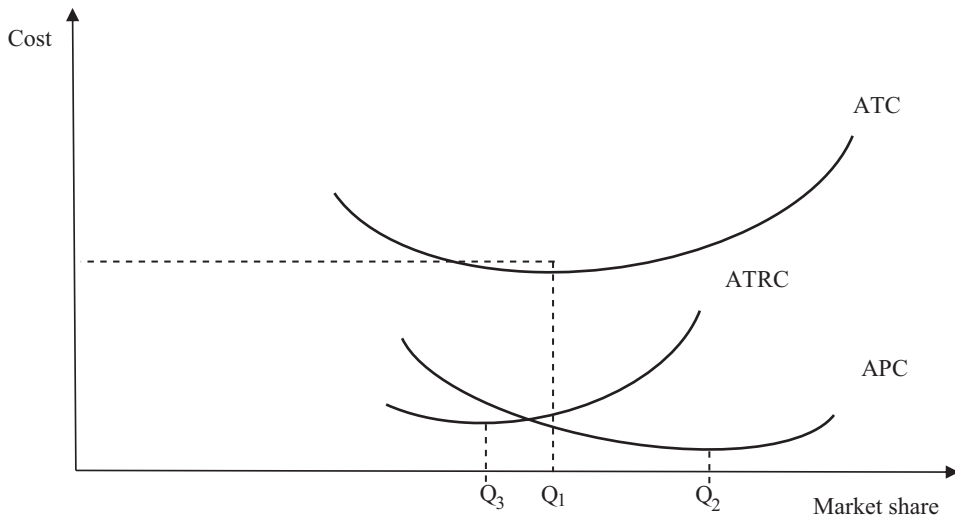
Chart 2.1. Production and transaction costs along with market share

APC – average production costs
ATC – average total costs
ATRC – average transaction costs

Source: (Jones & Butler, 1988, p. 208).

The dependence between production costs and transaction costs observed by Jones and Butler (1988) became the starting point for studies on a company's engagement in foreign operations. Since it is still difficult to reach an agreement on a common definition and explicit measure of transaction costs,[36] this issue is much less frequently raised than, for example, the issue of choosing the optimal market entry mode. This reluctance is due to the fact that entry mode research is most commonly based on Williamson's (1975, 1985) approach to transaction costs measurement, where the "measure" is established by assessing the asset specificity needed in production as well as transaction frequency and uncertainty. Assessing the company's optimal engagement abroad is a more complex task as it requires establishing some actual level of transaction costs. However, in the 1970s and 1980s when studies on transaction costs measurement were especially intense, the available data did not allow for detailed analysis to be made.[37]

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[36] More information on the topic can be found in Chapter Three.
[37] The necessity to measure transaction costs through the use of financial statements was already indicated by Coase (1990). For more information see Chapter Three.

2.2. Levels of economic analysis and new institutional economics

The new institutional economics was born in response to distrust regarding the limitations of neoclassical theory and the belief that the neoclassical approach does not take into consideration an important mechanism influencing companies and the economy–institutions. The analysis of institutional differences becomes crucial in understanding the reasons for economic development in catching-up countries, where the attempt to apply orthodox theory or even development economics does not give tangible results (Legiędź, 2013; Tywoniak, Galvin, & Davis, 2007). In spite of the different conceptual assumptions new institutional economics does not contradict neoclassical theory, but supplements it by viewing the company as more than just a production function. In retrospect, it is worth noting that the new institutional economics offers two research perspectives–a macroeconomic and a microeconomic one. The macroeconomic perspective, or otherwise institutional macro-level analysis, provides information on the influence of the institutional environment on a country's development. Microanalysis, however, focuses on the influence of the institutional environment on a single organisation (Legiędź, 2013).

The distinction of these two economic analysis levels is nothing new, since earlier theories also referred to a division into micro- and macroanalysis. However, a kind of novelty here is the synthesis of these two analysis levels, i.e. an attempt to answer the question as to how companies change in the face of globalisation (Rosińska, 2008). As Rosińska points out, companies are autonomous economic entities capable of independent organisation; however, at the same time they co-create a system and thus shape their own external environment. The author goes so far as to claim that companies co-create the global system, i.e. they create mechanisms and norms of functioning in the macroeconomic sense. It can be questioned whether a set of companies can directly impact the macroeconomic regulations, however the logic itself is understandable. Companies co-creating a system do, to some extent, affect the economic mechanisms.

In the light of the abovementioned considerations, one can come to the conclusion that the new institutional economics is also applicable to a mesoeconomic analysis, although this is an implicit assumption, rarely expressed explicitly. Rosińska (2008) cites the example of systems, understood as groups of companies creating the environment. Although she does not define the system explicitly, according to her assumptions a system might be a group of competing companies performing a specific business activity. In such a sense an industry–which is the subject of interest for mesoeconomic analyses–can also be labelled a system. Commons (1925, p. 375) suggests that the unit of analysis should be char-

acterised by conflict, mutuality and order; which is why in the new institutional economics it is generally accepted that the analysis refers directly or indirectly to a transaction, as such a unit is responsive to all three principles. However, as Williamson notes (1998), a transaction is not the only concept that meets the terms laid down by Commons–basically the main point of management–it can be a transaction, organisation or any management system. Coase (1937, 1960) and Williamson (1975, 1985) very often defined a company as a set of transactions. Accepting this line of reasoning means that since a company consists of transactions and the industry is made up of companies, it is in consequence a set of even more transactions (Mroczek-Dąbrowska, 2016b, p. 125).

Kapeller and Scholz-Wäckerle (2016) note further links between the new institutional economics and the mesoeconomy:

– systemicity and dynamism observed in the relations between institutions and industry entities,
– the ability of industry members (agents) to learn and use past experience,
– the ability of industry members to establish market relations and search for transaction costs optimisation (*social optima* vs. *individual optima*).

They point out that analyses carried out at the mesoeconomic level derive from the institutional approach inspired by the works of Veblen, Commons and Mitchell, as well as the new institutional economics. They also suggest that these concepts are much better suited for industry research than neoclassical theory. Dopfer and others (2004, pp. 268-269) claim that the mesoeconomic level is crucial in observing all market dependencies. They emphasise that the current neoclassical view of the economic system broken down to only the micro- and macroeconomic perspective is insufficient. Accepting the role of institutions as the warrant for executing rules and norms, allows questions to be raised concerning control and change–processes absolutely crucial from the perspective of new institutional economics.

A good summary of these considerations is the publication by Gorynia, Jankowska and Maślak (2000, p. 53) who indicate that the new institutional economics is well suited for the analysis of industry structure since it does the following:

– emphasises the role of the institutional environment,
– is not bound by the *homo oeconomicus* vision but adopts more realistic behavioural assumptions,
– provides tools for analysing the structure of economic systems, including monopolistic and oligopolistic behaviours manifested by some industries,
– allows for the use of normative theories regarding the issue of state policy,
– disregards the "black box" rule and analyses the processes occurring within an entity,
– emphasises that market solutions do not equal optimal solutions.

2.3. New institutional economics in mesoeconomic analysis

There are at least several research approaches, the use of which is justified in order to analyse industry processes. These include neoclassical theories, behavioural theories, managerial theories, evolutionary theories, and finally new institutional economics (Gorynia et al., 2000, p. 45). Considering the phenomenon in question–which is the process, as well as more precisely the degree, of industry internationalisation–in the following considerations the framework of the new institutional economics is introduced, setting more realistic behavioural assumptions, emphasising the importance of institutions in mutual interactions and allowing for the formulation of normative recommendations. The new institutional economics is, however, only one of the possible research frameworks, which largely supplements the still dominant neoclassical trend.

2.3.1. New institutional economics as a supplementation
to neoclassical economic analysis

The emergence of the new institutional economics is an attempt to respond to the needs of contemporary economists who see neither the real world nor adequate tools for analysing it in the neoclassical mainstream (Commons, 1932). The limitations of neoclassicism have led to a decentralised concept emerging that has been a subject of concern to eminent economists, whose contributions (Coase, Williamson, North) have led to Nobel Prizes in the field of economics.[38] Although the backbone of the new institutional economics is no longer the assumptions of mainstream economics, the theories are still more complementary than opposing. It is still difficult to agree on how to label the new institutional economics–as a trend or a separate field of study? Will it be "absorbed" over time by the neoclassical approach or will it give rise to a new paradigm in economics, emphasising the role and importance of institutions (Ménard & Shirley, 2014)?

The new institutional economics is less than perfect. As critics emphasise, it lacks a clear understanding of some basic concepts, to the extent that some scholars refuse to call it a theory. However, this concept rediscovers many fields other theories neglect, including behaviourism, law, political science, evolutionary theory, and organisation theory (Kozenkow, 2013). Ultimately, all the issues are concentrated around the so-called triptych (trinity) of new institutional economics: transaction costs, property rights and contracts.[39]

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[38] It is difficult to clearly determine when the new institutional economics had its beginning. Coase's first work on the theory of the firm dates back to the 1930s, but most of the research did not develop until the 1970s and 1980s.

[39] Contracts are interchangeably referred to as agent-principal relations. In some studies, this triptych is also called the triptych of the theory of transaction costs, property rights and agencies.

Despite the lack of consensus regarding some definitions (e.g. transaction costs, institutions), the new institutional economics has marked its presence in research on contracts and transactional organisation (e.g. Williamson), as well as the structure and functioning of economies (e.g. North). Regardless of the research topic, new institutional economics concludes that institutions are not just a background to economic analysis but should become its subject, since their functioning and specificity are the driving force for changes occurring in the economy (cf. Richter, 2005). However, understanding the term "institution" is yet again, not as simple as one might have anticipated. Williamson (1985) identifies an institution with a *governance structure*, whereas North (1981, 1990) sees it as *rules of behaviour* or otherwise *institutional constrains*. Moreover, North (1990) distinguishes between *institutional arrangements* and the *institutional environment*, where the first constitutes a subcategory of the latter (Richter, 2005). Despite the major definitional constraints, Hodgson (1998, p. 179) ventures to summarise the most distinguishing and indisputable specifics of institutions:

– all institutions require the active interaction of all agents involved where crucial feedback is shared,
– all institutions comprise of a number of characteristics, common conceptions and routines,
– all institutions sustain and are sustained by shared expectations, conceptions and beliefs,
– institutions are neither immutable nor immortal; however, they are relatively well-established, durable and self-reinforcing,
– institutions embody the values and processes of normative evolution. In particular, institutions reinforce their own moral legitimation: those that endure are often (rightly or wrongly) perceived as morally just.

There is an ongoing dispute whether institution refers only to the structures of social interactions involving norms, constrains and regulations, or whether it is a broader concept. Crawford and Ostrom (1995) while working on the conceptual basis of institutional analysis, name three approaches regarding institutions: *institutions-as-equilibria*, *institutions-as-norms* and *institutions-as-rules*. In the first approach, the institutions do not constitute a separate entity but form part of the economic system, running in the background. It is assumed that rational agents interact with one another, until a point where none of them is any longer interested in making any changes (improvements); that is, until a certain equilibrium is reached. There is no need to impose an external force to regulate the relations between the agents, since their behaviour is derived from mutual expectations. Thus, the institutions cannot be understood as a separate regulator of the transaction, but as an integral part of it. In conclusion, institutions can in other terms be labelled as stable patterns of behaviour (Ostrom, 2005). Obviously, some patterns are retained and imitated whilst others evolve or fall out of

use. Therefore, the *institutions-as-norms* approach sees these patterns (or habits) as *normative obligations* regulating which modes of behaviour can be ruled acceptable and which not. In this sense, understanding an institution as a rule implies that one accepts the existence of a *sanction*. If a particular behaviour pattern is deemed unacceptable, there is a high probability of a penalty being imposed. Therefore, from the *institutions-as-norms* and *institutions-as-rules* perspectives an institution is seen as a *regulator* that fosters, transmits and sustains the interactions between actors–which in turn suggests that an institution is not a pattern embedded in the actor's behaviour but is a separate entity. Considering the complexity of the term, it is worth not only taking a look at the nature of the concept, but also to discuss the functions which institutions are to perform in socio-economic systems (Parto, 2005, p. 37; Zalesko, 2014):

– associative, i.e. mechanism facilitating interaction among different groups,
– behavioural, i.e. social habits regulating activities and social relations,
– cognitive, i.e. mental models and constructs or definitions,
– constitutive, i.e. setting boundaries of social conduct,
– regulative, i.e. prescriptions and proscriptions (written and unwritten "rules of the game").

Given the complexity of the problem, over time the question has risen as to what *in practice* can be called an institution? Are institutions limited to the norms and rules that apply to all or do they include other habitual conduct in smaller societies? A bone of contention is, for instance, an organisation which is perceived as an institution by some and not by others (cf. Hodgson, 2006; North, 1990). North points out that it is crucial to distinguish between "norms (institutions) and players (organisations)"; which by many has been misinterpreted and simplified into a conclusion that those terms are not mutually entwined. In their correspondence North and Hodgson[40] came to an understanding that organisations are indeed kinds of institutions, though distinctly different in terms of specificity and analysis level. The specificity of an organization manifests itself in as follows (Hodgson, 2006, p. 18):

– ability to establish its boundaries and to distinguish its members from non-members,
– establishing principles of sovereignty and leadership,
– establishing chains of command delineating responsibilities within the structure.

Adopting this logical sequence, one can assume that research within the new institutional economics framework can be conducted on four levels:

– level 1: embeddedness (culture, norms, customs), where changes are extremely rare. Institutional constraints reduce uncertainty and lower transaction costs,

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[40] This correspondence is an important part of Hodgson's (2006) article on understanding institutions and their functioning.

– level 2: institutional environment (polity, judiciary, bureaucracy), where changes can take place over decades. The existing rules regulate the structure and productivity of economies,
– level 3: governance (contract), where changes occur over a few years. Transaction management allows for adjusting organisational structures and economic processes,
– level 4: resource allocation and employment (prices and quantities), where change is continuous. Levels 2 and 3 directly impact employment, prices and production volumes.

This division focuses on the understanding of the institution's specificity, broken down into the socio-economic perspective and the internal organisational structure. However, it also indirectly translates into levels of economic analysis (macro, meso and micro), which is discussed in more detail in subchapter 2.2.

2.3.2. Bounded rationality and opportunism as a conceptual basis for the new institutional economics

As has already been mentioned, transaction cost theory does not stand in opposition to neoclassical theory but complements it. Therefore it adopts a number of its assumptions. It is still assumed that the available resources are limited and that companies compete for them, which in turn results in the need to make allocative choices. However, institutional analysis also uses the price mechanism as an analytical tool (Słomka-Gołębiowska, 2009, p. 114). One of the criticisms directed against neoclassical theory refers to its rigid assumptions that do not exist in the real world. The new institutional economics assumes that marginal analysis alone is not sufficient to fully explain the causes of the emergence of exchange relationships in the market.

Behavioural elements are also taken into account here, questioning the idea of *homo oeconomicus*. The decision-maker, when making decisions is to a very large extent irrational (Simon, 1961, 1982; Williamson, 1985). His/Her behaviour, referred to as bounded rationality, is however, not intentional as it results from limited access to information. Therefore, the neoclassical assumption about full rationality and the ability to always make the most optimal decision has to be questioned.

Simon (1961) and his followers–including Williamson (1985)–distinguish three levels of rationality:[41] *full rationality*, *bounded rationality* and *organic ra-*

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[41] In the initial phase of his work on the assumptions of transaction cost theory Williamson was quite reluctant to refer to the concept of bounded rationality. This was due to a departure from "mainstream" assumptions which in turn did not harmonise with the contemporary views of many economists (Foss, 2003a; Pessali, 2006).

tionality. They do not preclude, however, adding completely irrational behaviour to the analysis. Activities aiming at maximising rationality refer to neoclassical theory and consist in the attempt to optimize the allocation of company resources. Bounded rationality results from the asymmetry of information which is not equally available to all subjects. Therefore it is assumed that decisions are "intentionally rational" (Simon, 1961, p. 24). The weakest form of rationality is organic rationality which assumes that decisions are not based on previously thought-out plans.

As a consequence the new institutional economics has adopted a number of other assumptions that steam directly from the bounded rationality assumption (Verbeke & Yuan, 2005):
– incomplete information;
– the limited ability of top management to process information;
– discrepancies in the analysis through which the same piece of information can be seen (often extremely) differently by different decision-makers;
– complexity and the storage of information through which it is difficult to separate key issues and secondary ones that have no significant impact on the matter.

The bounded rationality of decision-makers is directly linked to another assumption of the transaction cost theory, i.e. opportunism (Verbeke, 2003). The profit orientation of an entity can take one of three forms: *opportunism*, *open selfishness* and *obedience* (Williamson, 1985). Transaction cost theory assumes complete opportunism, that is, in practice the possibility of concealing certain information or misleading a partner in order to gain an advantage. Opportunism can take the form of *ex ante* opportunism for actions before the conclusion of the contract, and *ex post* opportunism referring to behaviour after its realisation (Tepexpa Solis, 2011, p. 15; Verbeke & Greidanus, 2009). The likelihood of this phenomenon is reduced if long-term cooperation is expected. Open selfishness is characteristic of neoclassical theory since it means a situation in which there are no costs of acquiring information on the market. The last level, that is obedience, only refers to utopian models where self-interest is absent.

Although the new institutional economics creates opportunities for many analytical studies, some researchers limit their research *strictly* to the concept's assumptions. Casson (2000) emphasises that it is one of the most important assumptions concerning the operation of a company, and at the same time points out that it is rarely reflected in the analytical parts of research. Similarly Madhok (2006) believes that opportunism is an inherent factor in market transactions. However, it is of particular importance in the case of the initial activity of a company (e.g. entering new foreign markets), but its importance rapidly decreases with acquired experience. Madhok also stresses that opportunism should not be confused with constraints resulting from a different perception and interpretation

of information where the purpose is not to gain advantage over a business partner. Therefore, the transaction effectiveness will result not only from the opportunism and information asymmetry, but also from other actions that may affect the execution of the transaction, e.g. scrupulous observance of the arrangements by one of the partners even to the detriment of the contract (*overcommitment*) (Verbeke & Greidanus, 2009). Verbeke and Greidanus also refer to so-called *bounded reliability* or insufficient actions aimed at the proper realisation of the transaction. Such behaviour, next to opportunism and incomplete information, remain the cause of disturbances in the real world. As a result of these assumptions transaction cost theory has become a tool of dynamic analysis (Buckley & Casson, 1998). Dynamics means that the parties involved in the execution of the contract are responsible for the changes in the environment and adapt their decisions accordingly (Ghoshal, 2005).

Analysing the assumptions of the new institutional economics, Slater and Spencer (2000) come to the conclusion that another phenomenon embedded in this concept is *uncertainty*. Williamson (1975, 1985) recognised that uncertainty is part of the information asymmetry and thus *implicitly* it is included in the assumptions of this concept. Slater and Spencer (2000) suggested that according to Williamson's approach, bounded rationality allows for the existence of a set of many countable scenarios of future events the knowledge of which is only limited to the cost of acquiring information. However, these future events are characterised by uncertainty since in reality even an entity that is ready to bear high costs will not obtain complete knowledge of the future from the market. Apart from behavioural assumptions the inclusion of moral principles as a foundation of the new institutional economics has also been considered, but eventually the idea was dropped[42] (Noorderhaven, 1996, pp. 105-122).

It can be argued that bounded rationality, opportunism and information asymmetry as the behavioural foundations of the new institutional economics are not enough. Thaler (2000, pp. 133-134) suggests that contemporary economic studies suffer from certain biases that fail to be included into the analyses. These include:
– *(over)optimism* which induces the companies to predict that circumstances will adjust to their needs,

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[42] Noorderhaven (1996), instead of uncertainty, uses the term trust, which has an ethical origin. According to him (p. 109), trust is defined as "(increasing) one's vulnerability to another whose behaviour is not under one's control" and refers only to interpersonal trust in business relationships. He suggests that instead of a model based on pure opportunism a *split-core* model should be introduced referring both to opportunism and trust since both of these qualities characterise human nature and one rarely exists without the other. Whether one of the two characteristics prevails depends mainly on the degree of asymmetry of the information and postulated objectives. According to Noorderhaven, opportunism entails higher transaction costs since it is necessary to use greater *safeguards*.

– *overconfidence* which makes the companies believe their choices are better in relation to other market players,
– *false consensus effect* which leads companies to believe other market players will share their perspective,
– *curse of knowledge* which causes companies to take some information/approaches as granted and reject alternative solutions to problems.

Thaler (2000, pp. 137-138) goes even further to suggest that perhaps bounded rationality is not valid any more. His studies of human cognition prove that *homo oeconomicus* and its degree of rationality declines due to decreasing learning capabilities and effect, significant heterogeneity of agents and emotionality. Thaler concludes that for the sake of economic models' utility, psychology and behavioural assumptions need to be developed and incorporated into science more profoundly.

2.4. Transaction costs in degree of industry internationalisation research

As Williamson (1985, p. 387) states, transaction cost theory as a part of the new institutional economics

(…) is a comparative institutional approach to the study of economic organization in which the transaction is made the basic unit of analysis. It is interdisciplinary, involving aspects of economics, law, and organization theory. It has relatively broad scope and application. Virtually any relation, economic or otherwise, that takes the form of or can be described as a contracting problem can be evaluated to advantage in transaction cost economics terms. Most explicit contracting relations qualify; many implicit contracting relations do also.

As emphasised earlier, a company, industry or even the entire economy consists of numerous transactions, and therefore there are no indications that the transaction cost framework should not be used in their analysis. Although the concept of transaction costs has aroused emotions since its inception, there are no reasons preventing its application at various levels of economic analysis. However, one should bear in mind the fact that the higher the data aggregation level, the more complex the contractual relationships observed.

2.4.1. The transaction costs notion–conceptual differences

Mainstream economics focuses on production costs which are perceived as *the* costs retaining explanatory primacy in contractual relations. However, over time it became clear that production costs are not the only significant costs resulting from the transaction. The phenomenon of *market failure* is associated with market imperfections, which since the 1970s have been aligned precisely with transaction costs (Coase, 1972).

Despite almost 50 years of research on transaction costs–offering both theoretical and empirical grounding for the legitimacy of new institutional economics–there is still no commonly accepted definition of this concept (Allen, 2006). The conceptualisation of transaction costs is very often set in the context of property rights theory since it relates to the costs incurred while transferring ownership from the seller to the buyer. Many scholars recognise property rights transfers as the explanatory grounds for transaction costs; however, the concept certainly lacks the means to operationalise the notion of transaction costs. In the 1980s Williamson (1985) made a vital contribution to the understanding of transaction costs when he proposed to see them through the lenses of transaction's unique features – asset specificity, frequency and uncertainty. Eventually, in this vein, other researchers attempted to fill the gap by creating apt measurement tools which would enable an assessment of the actual level of transaction costs (Wang, 2003).

2.4.1.1. Transaction costs as a consequence of property rights transfer

Until the 1940s an expression that was synonymous with transaction cost was that of *friction*–which was taken from physics. Friction served to illustrate the process of the adaptation of prices on the goods and services market which in practice covered the scope of what, today, is referred to as transaction costs (Hardt, 2009, p. 51). Just as the presence of friction in mechanics is undeniable, similarly, market transactions are not devoid of a certain burden. Coase–generally considered to be the father to the transaction costs concept–in his work *The nature of the firm* (1937) does not use the actual term "transaction costs" and only refers to the costs of utilising the price mechanism. For a long time this operationalisation remained the only attempt to narrow down the concept of the cost of operating market mechanisms. The first use of the term "transaction costs" was in 1940 by Scitovsky (1940, p. 307) who referred to the capital market, though many people wrongly attribute this achievement to Arrow (Dietrich, 1994, p. 19). Regardless of the nomenclature these costs remained "pure tautology" (Hardt, 2009, p. 96), which did not allow them to be translated into empirical research.

The theory which to a certain degree facilitates the understanding of transaction costs is the property rights theory (Demsetz, 1964, 1966, 1967, 1968). Property rights can be seen from various angles–in legal, economic and even natural terms (Allen, 2006). At first sight these angles overlap, but this is not always the case. Owning property rights means–in the simplest terms–the ability to freely manage an item and thus explicitly invokes the legal and economic perspective of the notion. Without owning the property rights one would not be able to enter into a transaction and thus engage in a contractual relationship; the more reliable the exchange relationship and the more explicit the recognition of property rights, the better the outcome generated from the transaction. Transferring property rights comes however at a certain expense–of time and money. Therefore, in the property rights approach, transaction costs are the costs of establishing and maintaining the property rights of a given item. These costs can be incurred by various parties: individual entities, government agencies or other decision makers. When transaction costs amount to zero, property rights are considered to be perfect, as they do not require any safeguards to be maintained. If the transaction costs increase well above the average level, the property rights are considered non-existent as they are extremely hard to exercise (e.g. due to a faulty institutional environment) (Allen, 2006).

The level of transaction costs will be directly affected by institutions' and states' engagement–the more stable the institutional and legislative environment, the lower the transaction costs. The level of these costs does not result from the mere number of legal constrains, since an excessive number and regulatory complexity may generate above-average burdens. A complete lack or minimum scope of legal foundations regarding property rights will also generate additional *ex post costs.*[43] The emergence of institutions sets a certain level to transaction costs, and sound institutions may over time mitigate the uncertainty risks associated with the execution of a transaction (Martens, 2003).

Understanding transaction costs in the context of property rights theory also has its limitations. In this approach, to assume the existence of transaction costs, property rights must be transferred. Thus, when a transaction takes place within an organisation and no explicit transfer of property rights occurs, transaction costs should not arise (Hardt, 2006). Therefore, Williamson (1985) in his analysis separates transaction costs from property rights and argues that transaction costs also arise as a result of the internalization of the company's operations.

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[43] Martens (2004) divides transaction costs into *ex ante* costs and *ex post* costs. The *ex ante* costs are identified with all expenses incurred prior to the transaction. *Ex post* costs mean expenses that a company has to incur after a contract's fulfilment as a result of inadequate transaction preparation, e.g. court costs.

2.4.1.2. Transaction costs and the nature of transactions

Transaction costs may vary from *market costs* to which the property rights theory refers to, through *managerial costs*, i.e. costs of managing an organisation, up to even *political costs*, i.e. costs related to maintaining or changing the institutional environment (Kowalska, 2005). To be able to correctly analyse and interpret transaction costs one has to address the nature of the transaction which determines the way the contracts are executed (Williamson, 1985). Williamson promotes three dimensions in which a transaction should be considered: asset specificity, frequency and uncertainty (disturbances).

The asset specificity is commonly regarded as the crucial dimension of the transaction. Asset specificity underlies the transaction costs theory because if contracts did not divide into those requiring special purpose investment and those requiring general investment one could go so far as to say that the market is fully competitive (cf. Williamson, 1998, p. 69), and therefore all companies would have an equal chance to make the transaction. This specificity determines how unique the resources necessary to carry out the transaction are. At the same time Williamson (1985) stresses that assets cannot be understood here as an accounting item. Assets take different forms–both fixed assets and human capital– and their specificity refers not to accounting values but to their transferability to other processes and contracts. If the assets are inherently transferable a company deals with low asset specificity; and when they require additional expenses, transactions are subject to high asset specificity.

Another feature of transactions is their frequency. Frequency refers to the number of transactions carried out, but also to the company's portfolio structure. The managing costs are lower in cases of recurring transactions as they do not require specific expenditure related to monitoring the preparation and execution of the contract (Kowalska, 2005).

The last of a transaction's dimensions is its uncertainty, often equated with a transactions' risk. Risk and uncertainty are often used interchangeably, which is a misuse. Knight (1964) and Keynes (1921) are credited for in-depth studies on those phenomena. Although precise definitions of risk and uncertainty have not yet been established, there are commonly accepted distinctions between these two concepts. Risk can be described as a *probability* of loss (or liability) caused by either external or internal vulnerabilities that could be avoided through preemptive action. Uncertainty is attributed to a situation in which the nature of a process or its outcome are unpredictable. According to Knight (1964) and Bochenek (2012, pp. 52-53):

– risk is a specified occurrence whilst uncertainty represents "the unknown",
– risk is attributed to facts and situations that have a negative association whilst uncertainty can have both positive and negative connotations,

– risk is *measureable* whilst uncertainty is *unmeasurable*; risk is a situation where probability distribution and its mode of occurrence can be established *a priori*.

This feature is a complex one as uncertainty can be seen both as endogenous and exogenous. Endogenous uncertainty results from company-specific conditions while exogenous uncertainty is attributed to unexpected changes outside the company. The basic assumptions adopted in the concept of transaction costs–opportunism, bounded rationality and asymmetry of information–will have a major impact on uncertainty.

2.4.2. The role of transaction costs in firm and industry level analysis

The transaction costs approach regards a single transaction as a basic unit of analysis. In practice, however, it is difficult to relate to such an elementary item as a transaction, therefore in empirical research on organisations researchers abandon the idea to analyse a bundle of transactions (cf. e.g. Arrow, 1969; Brouthers, 2013; Meyer, 2001; Wallis & North, 1986). However, this does not mean abandoning the fundamental assumptions of the transactional costs theory–the research unit still remains the transaction and its features, it is only perceived from a different angle. In practice, in the case of research on organisations, this requires analysing various market and in-house contracts in a certain time period.

The same method, namely the aggregation of multiple transactions, can be applied in the case of industry analysis. Such aggregation will be much more complex as it will not refer to relatively homogeneous transactions but to heterogeneous companies–different in terms of size, scope of activities, legal and organisational structure, etc. Therefore, despite the unquestionable existence of certain links within an industry, one has to consider the fact that the aggregates created will depend on many factors. Thus, the question may arise as to what information can be provided by indicators aggregated to such level.

Firstly, knowing the industry transaction costs structure means one can judge its performance (or more precisely, its profitability). Profitability is one of the most commonly considered factors in determining industry attractiveness, which in turn enables the strategies of companies already functioning in the industry to be predicted as well as potential new entries. Separating transaction costs from production costs–however difficult–enables companies and other institutions to make a forecast as to the potential investments needed in different cost areas.

Knowledge of the transaction costs structure (and level) also enables a cross--sectional review of the strategies adopted within an industry. Most companies perceive transaction costs as an unnecessary burden and strive to minimize (or optimise) their level. Thus, bearing in mind the comparability prerequisite, one

can attempt to verify what impact industry strategies have on a company's cost-
-effectiveness.

Finally, the assessment of the levels of industry transaction costs opens up new perspectives on analysing the industry itself. Just as transaction costs determine company level decisions; including market entry modes, choices on vertical and horizontal integration or other expansion decisions; they can also impact industry development paths–sales revenues, pace of growth and internationalisation openness.

Summary

Industry is a certain "whole" composed of interrelated elements–industry players–having its own hierarchical structure in which various processes occur and which it is subject to (Jankowska, 2002, pp. 236-237). Thus, an industry is to some extent similar to a company which also undergoes certain transformations. Therefore, in the analysis of industry, and specifically in the analysis of industry internationalisation, it is possible to apply various research concepts usually attributed to microeconomic level studies.

The framework of the new institutional economics–applied here–is a reminder that internationalisation processes may and even should be considered in an institutional context. A special place in shaping the degree of internationalisation is attributed to transaction costs, which at the firm level most often determine foreign market entry modes. Transaction costs, as the name suggests, are associated with the execution of a contract, as a result of which ownership rights are transferred. In practice, when studying the internationalisation process–but not only then–transaction costs are assessed by invoking the dimensions of transactions; asset specificity, transaction frequency and uncertainty. Although these features can also be assessed at the industry level, Coase (1990) proposed an alternative approach based on companies' financial statements. His ideas on operationalising transaction costs this way will be presented in the following chapter–and will later be applied in the empirical research aimed at assessing the degree of industry internationalisation in Poland.

3. The degree of industry internationalisation from the perspective of new institutional economics–research and empirical model design

Chapter Three focuses on the research procedure of the proposed empirical research. As the title suggests, the aim of the study is to assess the degree of internationalisation of Polish industries and determine the factors influencing the phenomenon. To this end, the proposed research scheme is discussed, referring mainly to the context of the new institutional economics and Yip's forces of globalisation model. The selection and distribution of the research sample as well as the construction of the measuring instruments is also discussed.

This chapter is also devoted to the first part of the studies, i.e. establishing the degree of internationalisation among Polish industries. This degree is assessed from the perspective of 2007-2015, which covers periods immediately before, during and after the economic crisis.

3.1. Research scheme and procedure

In order to increase innovation and the pace of company development, national economic policies are usually directed towards activities aimed at supporting the international ventures of domestic companies. Such expansion not only creates new opportunities related to acquiring new markets, but it also facilitates technology transfers and innovation processes which in turn boost industry competitiveness (Mińska-Struzik, 2014). Therefore, although industry internationalisation has not been at the centre of researchers' interests, good reasons exist for deepening the issue. To the author's best knowledge, no study has so far focused on determining the factors impacting the paths of industry internationalisation.

The work has one main goal but divided into two specific threads: to assess the degree of internationalisation of Polish industries between 2007 and 2015, as well as to establish the determinants of internationalisation. To achieve this aim, the following more detailed goals were set:

- conceptualisation of the terms concerning the degree of industry internationalisation,
- assessing the transferability of micro-level internationalisation concepts into meso-level analysis and proposing an original measure for the degree of industry internationalisation,
- preparing a ranking of the least and most internationalised industries in Poland,
- examining industries with the largest amplitude of change in their degree of internationalisation between 2007 and 2015.

As a consequence, the proposed research procedure consists of three stages with the aim of exploring the industry internationalisation phenomenon on the basis of the Polish economy (Table 3.1).

Table 3.1. Research procedure

Stage	Procedure	Aim	Method
Stage I	research on the impact of the economic crisis on industries in Poland	creating rankings of the least and most internationalised industries in poland	– reliability analysis – statistical inference
Stage IIa	research on quantifying the degree of industry internationalisation	determining the forms (and component weights) for quantifying the degree of outward and inward industry internationalisation	– literature review – Delphi method
Stage IIb	research on quantifying the degree of industry outward internationalisation	ranking industries according to their degree of industry outward internationalisation	– reliability analysis – statistical inference
Stage IIc		creating a typology of Polish industries based on degree of industry outward internationalisation	– k-means clustering
Stage III	research on the determinants of the degree of industry outward internationalisation	verifying hypotheses H1-H8	– descriptive statistics – panel models

Stage I of the research procedure concerns studies on the impact the economic crisis has exerted on Polish industries. A ranking of industries that have been most and least affected by the economic turbulences was prepared. Moreover, it was also vital to analyse those industries which exhibited the greatest difficulty in reaching pre-crisis conditions. The research depicted studies by Dzikowska, Gorynia and Jankowska (2016); however, they encompass both production and non-production industries.

Stage IIa focuses on research as to the degree of industry internationalisation from both the outward and inward perspectives. Although the literature on the degree of internationalisation at the mesoeconomic level is rather scarce, the overall framework can be based on the experience of companies. Despite a lack of consensus on operationalising the "degree of internationalisation"–which is a common problem regarding many international business related concepts–there is definitely a visible line between an active and passive approach to internationalisation. Therefore, in transferring these notions to an industry perspective, the degree of industry internationalisation will also be discussed with this particular distinction in mind. Although Sullivan (1994a) in designing his proposal for measuring the degree of internationalisation refrains from differentiating the significance of the individual components, here the study reflects on the relative *meaning* of the dimensions of internationalisation. The weights are established based on a Delphi study conducted on a number of executives and managers responsible for company operations abroad. Details of the study can be found in subchapter 5.1.

In stage IIb research on the degree of industry internationalisation is continued. Having constructed measurements for the degree of internationalisation, their reliability was verified and–based on the PontInfo Gospodarka database–industries were ranked according to their internationalisation advancement. Rankings were created for the years 2007-2015. Although steps were previously taken regarding both outward and inward internationalisation, here the focus is on the outward one. The main aim of this stage is to discover which industries exhibit the highest degree of internationalisation and how the phenomenon changed over time (especially in the crisis and post-crisis phases).

Stage IIc constitutes the final phase of work on the degree of industry internationalisation. Here, an attempt is made to create a typology of Polish industries based on their internationalisation features. The clustering follows the *k*-means procedure; the results obtained being cross-referenced against other typologies found in the literature review and afterwards their main distinctive characteristics are discussed.

The final phase, stage III, is devoted to establishing the determinants of the degree of industry outward internationalisation. By using panel model(s) analysis potential factors influencing the expansion process are verified. They include the level of industry transaction costs, industry technological advancement, industry type, industry life cycle phase, degree of internal industry internationalisation, level of industry rivalry. Again, the need to delineate the outward and inward concepts of internationalisation can be seen here since the study assumes that a relationship between these two phenomena exists.

The construction of the research procedure is a direct consequence of the substantive premises of the research problem, but it also results from certain

non-subject-related restrictions. The literature often suggests the use of mixed-method study, i.e. combining quantitative and qualitative research tools. Since the study adopts a mesoeconomic perspective towards the research problem, the author decided not to include qualitative research. Enriching the research with such a method would require the analysis of all, but in practice a few select-ed, economic entities from each industry, and would thus transfer the burden of analysis from the mesoeconomic level to the microeconomic level. Drawing conclusions based on such results would be–to say the least–problematic.

The hypotheses included in the research scheme are based on an in-depth literature review. Unfortunately, as mentioned before, the literature on industry internationalisation is very limited. If an industry approach is taken into con-sideration, most often analysed are economies of scale, expenditure on research and development, product differentiation and transport costs (Vahlne & Nord-strom, 1993, p. 535). All of these items relate directly to the level of transaction costs (Williamson, 1985; Wang, 2003). Product diversity and R&D expenditures translate into asset specificity; while economies of scale, along with transporta-tion costs, on the frequency of transactions. The implemented economic policy corresponds on the other hand with the external uncertainty level. Therefore, the presented hypotheses relate directly to the new institutional economics, and transaction costs in particular (Williamson, 1985).

As Williamson (1985, p. 23) claims, "the field of specialization with which transaction cost economics is most closely associated is industrial organization". In his work Williamson underlines that both the industrial organisation and the transaction cost theory share the same approach to analysing the contractual na-ture of the economy. Industrial organisation builds on the theory of the firm, ana-lysing the structure and relation of firms and markets. It reflects on the market imperfections–transaction costs, information asymmetry, entry barriers, etc. and firms imperfections–bounded rationality or opportunistic behaviour. Therefore, in many aspects, transaction cost economics and industrial organisation overlap.

Bearing in mind that transaction costs theory sees a single transaction as a re-search unit, the author feels it could also be implemented in industry research (McCann, Arita, & Gordon, 2002, p. 648). Companies are perceived as a set of transactions and industries consist of companies, therefore industries combine multiple sets of transactions. Such an approach simplifies an industry down to a set of companies, disregarding industrial institutions and non-profit entities. However, in measuring the degree of internationalisation the focus lies only on entities making direct sales, so such a narrowed definition suits the aim. Ac-cording to the proposed model, potential determinants of an industry's degree of internationalisation can be divided into different groups that directly or indirectly influence the process (Figure 3.1).
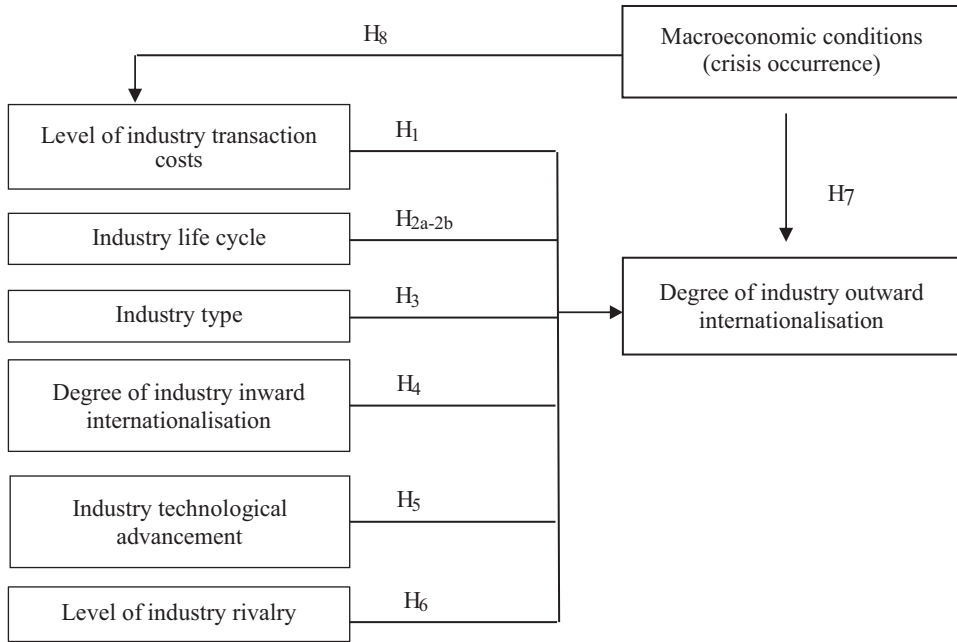
Figure 3.1. Determinants of the degree of industry outward internationalisation–the proposed research scheme

In his assessment of the transaction cost economics, Williamson (1985, p. 390) stresses that one of the major drawbacks of this framework is its crudeness. He insists that along the transaction costs line, factors that are responsible for trade-off differences–including technology advances, rivalry nature and market attributes–are to be considered. In other words, transaction costs framework alone cannot be seen as a complete tool of analysis and should be supplemented with other aspects that extend beyond the transaction costs concept.

Therefore, the research scheme (Figure 3.1) is based on the assumptions of the new institutional economics as well as the forces of globalisation according to Yip. Bearing in mind the differences between internationalisation and globalisation, it can be easily noticed that some globalisation factors also exert a direct impact on the degree of industry internationalisation. These factors include government, costs and competitive determinants. This is not so with market factors. As indicated in Table 1.5, industry globalisation means striving to create a common global market where no further divisions into internal markets are needed. Hence, market factors underline the uniformisation of customer needs, the existence of global buyers, and upgrading infrastructure to a similar global level. In other words, these factors relate to market conditions created by different countries. They relate to the so-called *pull factors*. What constitutes the

interest of this work are the so-called *push factors*, i.e. domestic market factors "forcing" industries to increase international involvement (Table 3.2).

Table 3.2. Potential determinants of industry internationalisation

Government	Costs	Competitive
– significance for the economy – grants	– level of industry transaction costs – industry technological advancement – industry type – industry life cycle	– degree of industry inward internationalisation – level of industry rivalry

3.1.1. Level of industry transaction costs

The new institutional economics, and in particular the concept of transaction costs, contributes to research on many up-to-date questions as to the internationalisation process, such as the optimal scope of foreign involvement or the preferable foreign market entry modes (Williamson, 1985). Although transaction costs, as the name itself suggests, are aligned with a single transaction their assessment, however, usually takes place at the company level, and thus refers to a bundle of transactions. As noted in the Chapter Two transaction costs can also be aggregated to higher levels, and this has been proved by Wallis and North (1986). Based on Coase's (1990) assumption that transaction costs are reflected in the financial statements of companies it is feasible to assess them through the use of the profit and loss statement (at industry level by aggregating the data from single companies). There are five aspects representing transaction costs: sales costs, part of administrative costs, part of operating expenses, part of income tax, and net profit.

The level of net profit determines whether the transaction takes place on the market or not and can therefore, according to Williamson's (1985) understanding, be seen as an equivalent of risk (uncertainty). The sum of other previously mentioned costs constitutes either *ex ante* or *ex post* transaction costs. If one assumes that one of a company's efficiency measures is net profit then the industry as a whole should aim at increasing it (both in absolute and relative terms). One of the ways of achieving this is the reduction of other transaction costs which directly impact the level of net profit. This can be done for instance by internationalisation which boosts the economics of scale. Hence H1 refers to the relationship between the degree of outward internationalisation and the level of transaction costs of an industry:

H1: The higher the level of industry transaction costs, the higher the degree of industry outward internationalisation.

3.1.2. Industry life cycle

The concept of an international life cycle assumes that launching and increasing sales of a product on foreign markets depends to a large extent on the phases of the product's life cycle (Onkvist & Shaw, 1983; Vernon, 1966). It is assumed that the initial phase of a product's internationalisation life takes place mainly in the form of exports, and more complex equity modes are only used in the maturity phase. Since the life cycle of a product is intertwined with the life cycle of the industry, one can presume that the cycle influences the company's as well as industry's degree of internationalisation (Andersson, 2004). Companies launch their foreign operations in different life cycle phases, and intensifying their engagement–both in terms of operational scope, geographical dispersion and equity involvement–is spread over time. Increasing the scope of a company's foreign expansion depends mostly on product specificity, industry pressure as well as the foreign policies adopted by the home country. Therefore, one can expect that the more mature the life cycle, the higher the degree of internationalisation. It is however quite obvious that such an observation can be attributed to production industries since the concept derives from the specificity of trading with goods.

Nevertheless, neither the product life cycle theory nor other theories (among others monopolistic advantage theory, internalization theory, the sequential internationalisation model) are able to explain the *born-globals* phenomenon (McDougall, Shane, & Oviatt, 1994). These companies–which mostly belong to the SME type–are characterised by much higher flexibility and quicker reactions to sudden changes in the environment. *Born-globals* perceive the market as a global one, and use internationalisation as a tool to acquire and then strengthen their position in the industry. Thus, if one cross-references their development patterns with the life cycle concept, it is easily recognised that they intensify their foreign engagement much earlier than "traditional" firms. Although no exact statistical data on the number of *born-globals* is available, they are mostly SMEs which belong to non-production industries (cf. Przybylska, 2010, p. 69). Therefore, to encompass both the traditional perspective on internationalisation and more recent developments, the following hypotheses H2a and H2b are suggested:

H2a: The industry life cycle phase is positively related to the degree of industry outward internationalisation in production industries.
H2b: The industry life cycle phase is not related to the degree of industry outward internationalisation in non-production industries.

3.1.3. Industry type

As most researchers acknowledge, the internationalisation process differs depending on whether one is dealing with production or non-production industries. Services are not *tradeable*, which means that they cannot be purchased with the intent to resell. Thus, the internationalisation process in such industries requires constant communication and physical presence for a contract to be closed. Unlike in the case of products, trading services is mostly limited by non-tariff barriers and other constrains such as the free movement of people or the recognition of qualifications. Increasing the trade in services is attributed to an increase in the foreign direct investment of production industries, which in turn forces the international expansion of related services such as insurance, finance and transport services, etc. The second wave of services internationalisation is related to the development of ICT, which stresses the need for offshoring services (Cave, 2006). However, despite the unquestionable increase in the importance of the global trade in services,[44] production companies still remain more "advanced" in the internationalisation process. Thus hypothesis H3 is formed:

H3: A higher degree of outward industry internationalisation appears in production rather than non-production industries.

3.1.4. The degree of industry inward internationalisation

Company internationalisation and at the same time industry internationalisation does not necessarily take place solely in an active way. The process also appears when one talks about passive (inward) internationalisation, meaning the inflow of capital and products/services from abroad. As a consequence, home-based companies are faced with at least two effects that can shape their future internationalisation strategies. Firstly, the inflow of capital (especially in the form of FDI) causes an increase of the competitive pressures in the market. Therefore, especially in maturity and declining industry business phases, companies may be forced to seek alternative sales markets. At the same time, companies co-exist in a network, where the export and import of products, services, technology or know-how and exposure to foreign partners might accelerate their decisions regarding foreign expansion (Grosse & Fonseca, 2012, p. 128; Ratajczak-Mrozek, Dymitrowski, & Małys, 2012, p. 221). Hence the following hypothesis H4:

H4: The higher the degree of industry inward internationalisation, the higher the degree of industry outward internationalisation.

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[44] The average annual growth between 1999 and 2004 amounted to 9.2%.

3.1.5. Technological advancement of an industry

High-tech industries are said to play an important role in shaping the competitive advantage of economics (Ratajczak-Mrozek, 2011; Weresa, 2012). The technological advancement of companies – and also therefore indirectly industries – are related to industry life cycles. In the introductory phase technological development goes hand in hand with product development and requires high capital input. The later the life cycle phase the more standardised and public technologies become. Initially, innovative companies concentrate on the domestic market, abandoning foreign market opportunities. The first steps towards internationalisation are undertaken normally in the growth stage and concern mostly industrialised countries. Since developed countries are generally the innovators, other countries do not normally initiate production and exports until the maturity stage.

There is a general consensus that high-tech industries are characterised by high innovation and degree of diffusion, extensive R&D expenditures, short product life cycles, high capital requirements and dynamic growth (Daszkiewicz, 2015). What is unique about *high-tech* industries is the decisive decision to abandon perceiving internationalisation as a mere tool for creating additional cash flow and by seeing it as a way of "discovering and creating new knowledge" (Gabrielsson, Kirpalani, Dimitratos, Solberg, & Zucchella, 2008). The industry specificity causes them–in accordance with the *International New Ventures* concept–to launch their international operations shortly after their inception. They often develop by *leapfrogging* which means that they do not follow the sequential internationalisation model and globalise by passing over some in-between stages instead. Therefore, hypothesis H5 is as follows:

H5: The more technologically advanced an industry, the higher the degree of industry outward internationalisation.

3.1.6. Level of industry rivalry

The Porter's (1980, 2008) Five Forces framework allows for determining an industry's (sector's) attractiveness. It reviews the bargaining power of suppliers and buyers, the threat of new entrants and substitute products appearing, as well as the existing level of rivalry among industry competitors. One of the factors that can push companies towards foreign expansion is precisely the level of industry rivalry. The economic theory of industries emphasises the importance of industry environment in the decision-making processes. If a company operates in a high-competition industry, it may be forced to fight for market share. If, in addition, a given market shows signs of saturation and the industry is in the ma-

turity or decline stage, the need to find new sources of revenue increases. Some companies, on the other hand, do not initiate internationalisation by themselves, but follow the path set by their industry competitors. The reasons for internationalisation may vary and include reducing the competitive gap between them and other industry competitors, gaining new markets, reducing costs, etc. Regardless of the reason, hypothesis H6 suggests the following:

H6: The more concentrated an industry, the higher the degree of industry outward internationalisation.

3.1.7. The general macroeconomic conditions

As the literature review shows, although the economic crisis caused by the global financial market imbalance started in the USA, it quickly spread to other countries, including Europe. Due to the unstable macroeconomic situation companies located in the USA and EU-15 declared a 40% drop in foreign market engagement, with CEE countries declaring a similar 20% drop (Dzikowska et al., 2017, p. 137). On the global market trade slowed significantly (Zelek, 2011a), yet despite these facts Poland managed to retain a positive GDP growth (2009) and has since been called a "green island" (Sawicka, 2010). Therefore, it is safe to assume that Polish companies perceived the economic slowdown as an "opportunity" not a "threat" and strove to enhance foreign engagement. However, due to a lack of governmental support (reduction in budget spending) and decreasing demand on foreign markets the FDI outflow was reduced (NBP, 2009, pp. 33-37). Therefore, the H7 hypothesis concerning the degree of internationalisation is divided into three phases; before, during and after the economic crisis and follows global market trends:

H7: The degree of industry outward internationalisation was higher before and after the economic crisis rather than during its occurrence.

One of the basic assumptions behind the new institutional economics is the thesis that contractual relations carry risks, often identified with uncertainty. The uncertainty directly influences the level of transaction costs since a high risk level requires the application of safeguards. Therefore, the macroeconomical conditions in which companies function significantly impacts the level of transaction costs in industries. Institutions supervise the proper execution of contracts and maintain stability. The understanding of institutions differs among the main representatives of the new institutional economics. Williamson (1985) identifies it with the governance structure, whereas North (1981, 1990) with rules of behaviour and institutional constrains. Irrespective of the exact definition, if institutions fulfil their role, they reduce the level of transaction costs in the economy.

The economic crisis has shaken the perception of institutions as stabilizers and defenders of property rights. This is caused by the increase in the unpredictability and therefore uncertainty regarding basic macroeconomic indicators. Hence H8 is as follows:

H8: Industry transaction costs were higher during rather than before and after the economic crisis.

3.2. Research sample selection and breakdown

The dataset for the study was made available by the administrator of the PontInfo Gospodarka database–which contains data aggregated to the level of classes in the PKD 2007 standard. This information is derived from the Statistics Poland and only concerns the activity of those companies employing more than 9 employees. They are classified according to the Polish regulations presented in subchapter 1.1.

The collected data refers to information aggregated from the company-level analysis. The database encompasses only those entities that employ more than 9 persons. However, the so-called micro-companies (<9 employees) between 2007 and 2015 constituted about 95% of all companies registered in Poland. This percentage would suggest that excluding them from the analysis equals a grand methodical error that could interfere with the final results. However, the author excludes them consciously. The micro-companies generate overall only about 20% of total revenues in the entire economy. Moreover, their export sales do not exceed on average 4% of total sales. Only about 2-3% of these firms engage in sales of goods abroad and even less (ca. 0.4%) in the sales of services (PARP, 2017b, p. 37). Most of the companies–due to their size–are unable to expand in forms other than non-equity modes. As Angowski (2008, p. 242) summarises "as a rule, such companies focus only on the local market and as their main goal see survival and not economic expansion". One in three micro-companies leaves the market within the first year from launching its operations. To the author's best knowledge none of the existing studies on the industry internationalisation includes micro-company data. Adding them to the analysis would mean presuming that all industries are local.

The Classification of Economic Activities currently in force in Poland distinguishes 615[45] classes–as indicated before, referring to Marshall's (1972) ap-

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[45] In some cases, the PKD 2007 classification does not account for classes, i.e. the final division is a group that covers no classes. In this case, the group is identified with the class, which is a common practice in international statistics.

proach–which are here identified as industries. Due to legal restrictions related to statistical confidentiality, the Statistics Poland does not provide data on all industries.[46] Therefore, the research sample in the first stage of the study was limited to 532 classes. This limitation results mainly from the previously mentioned legal restrictions, but also from the substantive elimination of sections which according to author should not be examined. These include the following:

– Section T, Activities of households as employers; Undifferentiated goods- and services-producing activities of households for own use,
– Section U, Activities of extraterritorial organisations and bodies.

Also, as indicated in subchapter 1.2.2, the proposed measure for the degree of internationalisation is not adequate for assessing the level of internationalisation in higher education or even in schools in general. Therefore, in Section, Education, the industry which refers directly to such activity (85.42 Tertiary education) is excluded from the study. At the same time, Appendix 5 includes the scores for other industries in this section; however, the values are presented there to illustrate the fact that the "traditional trade" approach to the internationalisation of education always implies a low degree of internationalisation. None of these industries were considered in the statistical analyses discussed in Stages I, IIb, IIc, and III (Table 3.2).

The sample size varies depending on the stage of the study, which directly results from the data availability necessary to conduct statistical analysis. The realisation of the objectives presented in subchapter 3.1 required the application of several separate analyses. Determining the level of outward internationalisation is possible for all 532 industries; however, due to a lack of some data, not all indicators could be presented for the entire 2007-2015 timeline. A detailed list of this stage of research can be found in Appendix 5. Industries are ranked as part of assessing the degree of industry internationalisation, which taking into account the partial lack of information, was possible for only 441 industries. Another stage of the analysis aims at preparing a ranking of the industries that were the least and most affected by the changes caused by the economic crisis. Again, cross-referencing the number of industries with the availability of selected economic indicators, only 338 industries qualified for the study. In the last stage of the analysis, where the hypotheses of the research scheme are verified, and which implies searching for the determinants of the degree of industry internationalisation, only 244 industries were taken into account. As before, this is caused by data unavailability. In subsequent stages, the author decided to refer to the different research samples since all analyses conducted are separate, and even though they are thematically related the results of one do not affect the results of the others.

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[46] Statistical confidentiality applies not only to selected classes, but also includes all business activities in Section O–Public administration and defence; compulsory social security.

In some parts of the study, data analysis indicated an industry breakdown into three main types: production, services and other industries. Previous studies commonly assumed that economic activity could only be divided into production and services, with sections G to K and M to O being considered services. However, since the implementation of the NACE Rev. 2 rules, such delimitation is blurry since even the "manufacturing" sections include some service activities. Hence, each activity will be classified separately, with the distinction as to whether it has a tangible or intangible character. Sections A to B are classified as "other" industries since they are difficult to align with either production or services. The sample size in each stage of the research procedure is presented in Table 3.3.

Table 3.3. The number of production, service and other industries in the research sample

Sample size	Production	Services	Other	Total
Stage I: impact of crisis on Polish industries	154	167	17	338
Stage IIa: quantifying degree of industry outward internationalisation	216	287	29	532
Stage IIb: ranking industries according to their degree of industry outward internationalisation	188	230	23	441
Stage IIc: typologies of Polish industries according to their internationalisation features	154	167	17	338
Stage III: determinants of the degree of industry internationalisation	118	117	9	244

In the remainder of the chapter, selected characteristics of the research sample will be presented, allowing for a better understanding of the industries analysed. The statistics invoked refer to 244 industries considered in the third stage of empirical research. This is due to the fact that Stage III is the key element of the analysis that allows a determination of the factors influencing the degree of industry outward internationalisation.

The units analysed were significantly different in size. Analysing the sample in the section breakdown, it can be concluded that regarding single economic entities the largest industries were present in Section B–Mining and quarrying; and Section D–Electricity, gas, steam and air conditioning supply. At the same time, the smallest section in this respect turned out to be Section L representing Real estate activities (Table 3.4).

Table 3.4. Average employment per unit–by section for the years 2007-2015

Sec-tion	2007	2008	2009	2010	2011	2012	2013	2014	2015
A	55	55	57	56	55	54	61	58	57
B	807	761	702	641	616	587	522	486	460
C	139	133	121	128	127	124	126	129	132
D	287	302	297	340	322	300	294	274	270
E	89	89	87	89	86	83	82	83	82
F	81	75	66	67	65	60	58	56	56
G	66	67	65	67	65	65	65	67	70
H	231	212	184	190	178	168	160	151	149
I	85	90	83	86	82	76	72	72	73
J	123	129	118	114	107	103	103	105	110
K	136	165	126	107	116	115	127	117	114
L	49	49	48	48	46	46	45	44	44
M	70	67	60	63	60	62	64	64	67
N	212	196	188	208	201	179	187	185	190
O	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Q	55	60	61	67	69	75	85	85	81
R	115	104	87	90	76	72	67	68	69
S	85	86	78	70	73	77	80	78	83

n/a – data not available.
Source: Based on the PontInfo Gospodarka database.

In terms of gross profitability industries showed much greater diversity. Section B, which in 2007 generated the highest gross profit rate (15.00%); in 2015 was ranked last with the weakest result of –0.62%. At the same time, this section achieved the highest profit rate which in 2011 reached 27.96%. While in the case of employment, the observed values in the sections remained at a relatively similar level throughout the analysed period (Table 3.4), the profitability level was subject to much greater fluctuations (Table 3.5).

Table 3.5. Gross profitability–by section for the years 2007-2015 (%)

Sec-tion	2007	2008	2009	2010	2011	2012	2013	2014	2015
A	8.08	3.95	7.87	9.39	11.47	12.06	11.43	16.7	15.6
B	15.00	13.76	8.70	15.65	27.96	13.14	8.02	2.56	–0.62
C	6.57	3.65	4.77	5.03	4.78	4.38	4.69	4.29	5.43
D	6.39	5.07	8.95	10.19	11.39	8.43	9.51	11.70	2.98
E	5.79	5.93	5.56	6.39	5.57	5.65	9.07	6.18	7.22

Table 3.5 – cont.

Sec-tion	2007	2008	2009	2010	2011	2012	2013	2014	2015
F	7.44	7.58	7.19	5.91	3.90	1.39	2.67	4.26	7.56
G	3.59	3.02	2.67	2.91	2.56	2.13	2.41	2.52	2.62
H	5.43	0.51	2.10	3.03	2.37	2.8	3.36	3.09	4.52
I	10.62	4.9	5.72	6.01	4.71	7.24	4.47	5.22	7.76
J	12.1	10.6	12.95	11.93	10.57	8.59	7.31	6.55	7.26
K	10.45	6.42	6.67	9.77	9.09	10.64	8.34	7.25	10.18
L	12.04	5.74	8.94	8.46	4.39	6.53	9.37	6.54	7.78
M	8.45	6.24	6.62	7.85	–9.14	9.96	7.45	9.27	7.32
N	8.77	4.94	5.39	3.70	5.40	5.18	4.74	5.15	4.27
O	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Q	5.63	5.79	5.53	3.64	1.88	3.30	3.90	2.94	3.36
R	5.85	3.91	2.69	1.32	1.27	2.82	1.79	0.93	1.66
S	11.29	9.48	7.98	7.15	6.98	6.55	3.83	7.76	7.79

n/a – data not available.
Source: Based on the PontInfo Gospodarka database.

3.3. Operationalisation of variables

The verification of the hypotheses required the selection of appropriate indicators that would represent the potential determinants of the degree of industry outward internationalisation. To ensure objectivity all the variables refer to hard data, i.e. data obtained from GUS F-01 reports. At the same time, apart from the Delphi research method taken into account in establishing the weights for the degree of industry inward and outward internationalisation, no opinion-making measures are applied.[47] According to the literature review, perceptual measures are usually used in microeconomic, not mesoeconomic studies (Luo & Peng, 1999).

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[47] It can be claimed that the failure to take into account subjective measures deprives the researcher of relevant information that is difficult to "capture" using only quantitative measures (cf. e.g. Sullivan, 1994a). Certainly this is an apt argument, but the study has been designed in such a way as to cover with an econometric model almost 50% of existing industries. Taking into account time and financial constraints, the inclusion of perceptual measures would significantly narrow the scope of the considerations. Additionally, it would be difficult to determine how many representatives of each class should be included in the qualitative study so that the answers obtained could be considered relevant and binding, and how to resolve the problem of contradictory answers.

Table 3.6. The econometric model–operationalisation of variables

Dependent variable	Operationalisation	Data source
Degree of industry outward internationalisation	aggregated measures as follows: number of companies active in foreign markets vs. the overall number of companies in the industry; foreign sales revenues vs. overall revenues; dominant entry modes (equity or non-equity) expressed by a dummy (0-1) variable	GUS data, NBP data
Independent variables	**Operationalisation**	**Data source**
Industry transaction costs	industry level aspects: cost of sales, part of administrative costs, part of operating expenses, part of income tax, and net profit vs. total industry revenues	Pont-Info Gospodarka database (based on GUS)
Degree of industry inward internationalisation	aggregated measures as follows: number of companies with foreign capital (>50%) vs. overall number of companies in the industry; revenues of companies with foreign capital in the domestic market vs. the overall industry revenues in the domestic market; number of importers vs. the overall number of companies in the industry	GUS data, NBP data
Industry technological advancement	share of R&D expenses vs. total expenses (%)	Pont-Info Gospodarka database (based on GUS)
Industry type	based on the Eurostat classification (numeric scale)	GUS data
Industry life cycle	the four stages are introduction, growth, maturity, and decline (numeric scale)	Pont-Info Gospodarka database (based on GUS)
Industry concentration	Herfindahl-Hirschman Index	Amadeus database
Control variables	**Operationalisation**	**Data source**
Industry size	number of companies in the industry (employing >9 persons)	Pont-Info Gospodarka database (based on GUS)
Significance for the economy	GDP share (%)	GUS data
Grants	value of grants vs. total revenue (%)	Pont-Info Gospodarka database (based on GUS)

The econometric model includes one dependent variable (the outward internationalisation degree) and six potential determinants, each of which is represented by one independent variable in the form of a simple or multivariate measure. The model also includes three control variables (Table 3.6).

3.3.1. Comments on the transaction cost operationalisation attempts

According to Fischer (1977, p. 322), the fact that in the literature there is no single generally accepted definition of transaction costs suggests that, "(...) there is a suspicion that almost anything can be rationalized by invoking suitably specified transaction costs". This statement is partly justified. Problems with the operationalisation of the transaction costs term have been evident since the 1970s, and despite the elapsed time and much attention little has changed so far. Dahlman (1979, p. 144) points out that the idea of transaction costs "has become a catch-all phrase for unspecified interferences with the price mechanism". However, as Hodgson (2014, p. 593) states, the lack of clear boundaries and problems with defining transaction costs should not be a reason for abandoning work on such a relevant matter.

The problem of transaction costs operationalisation and measurement has been frequently raised, amongst other by Allen (2006), Foss and Foss (2006), Kang (2001), Meyer (2001), Păun (2008), Shelanski and Klein (1995), Wang (1999, 2003), Williamson (2010, 2011) and others. The major constraint lies in the fact that it is extremely difficult to separate transaction related costs from costs otherwise borne by the company. Therefore, it is hard to establish the level of costs related to a single contract. Moreover, the notion of costs cannot only be identified with monetary value since it also encompasses other measures, e.g. time devoted to a transaction (Benham & Benham, 2001; de Soto, 1989).

Wallis and North (1986) have been one of the first to attempt measuring transaction costs in the American economy. Although they stress that strictly speaking they do not measure costs but assess the value of transaction services, in their analysis they constantly invoke transaction costs. By using Census reports they concentrate on the wages of transaction occupations in non-transaction industries since by that time gaining information on other costs was improbable. Nonetheless, by distinguishing transaction and non-transaction industries and assessing transaction services at the macroeconomic level, Wallis and North stepped outside the boundaries imposed by many previous studies. However, by assuming that the economy can be divided into transaction and non-transaction industries they excluded the possibility that transaction costs arise in the execution of any transaction, regardless of the industry.

Allen (2006) in his article on measuring transaction costs draws attention to the difference between transaction costs and exchange costs. The notion of trans-

action costs is definitely broader since it covers all the costs incurred as a result of the sale of goods and services as well as non-measurable costs, e.g. resulting from the internal organisation of a company. In the light of the abovementioned observations an interesting approach to measuring transaction costs is taken by Wang (2003, p. 2) who sees them as the "difference between the prices paid by the buyer and received by the seller". This definition suggests that transaction costs are the overall costs incurred by the firm (including production costs). The author does not entirely agree with such an approach, but shares the idea of assessing transaction costs from the profit and loss account of a company.

Coase (1990) in one of his articles for *The Accountant* suggests that accountancy and economics are mutually intertwined. Although he himself does not attempt to assess the level of transaction costs, he advocates using financial statements as the source of information on these costs. Milonakis and Meramveliotakis (2010) reply that in practice one deals with relatively objective *accountancy costs* and at the same time with subjective *economic costs*. Accountancy costs can be established on the basis of accountancy statements; however economic costs, e.g. opportunistic behaviour, cannot be assessed at all. Coase (1990) disagrees indicating that even economic costs can be found in financial statements, e.g. under administrative costs. As Coase, Edwards and Fowler (1938, 1939) claim, one of the very few threats to such measurement is the insufficient quality of the statements and lack of transparent accountancy rules. Over the years the introduction of national and international accounting standards means this constraint has lost much of its meaning.

3.3.2. Measurement of transaction costs–applied approach

Based on a company's profit and loss account it is not possible to assess the transaction costs of a single contract. However, it is possible to evaluate the costs incurred by the whole company (Gabrusewicz & Samelak, 2009). After subtracting the costs of the products, goods and materials sold from the net proceeds from their sale, one is left with the gross profit (loss) from sales. That is a value that *almost* equals the overall transaction costs of a company. Transaction costs do not include non-transaction items, i.e. operating expenses, financial expenses and extraordinary losses.[48] Unfortunately it could be pos-

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[48] Along with the amendment to the Accounting Act dated September 23rd, 2015 which came into force on January 1st, 2016 extraordinary gains and losses cease to be included as a separate category in the statement and thus they become another element of other operating income and expenses. This change does not apply to banks, insurance companies, reinsurance companies and credit unions. The amendment applied commencing with the statements prepared for the financial year starting on the day the amendment to the Act entered into force. The analysis of financial statements in this publication applies to the years 2007-2015; hence the division presented in the

Table 3.7. Profit and loss account and transaction costs of a company–by function

Statement Position	Includes	Transaction costs
Net proceeds from sales of products, goods and materials	– net proceeds from sales of products – net proceeds from sales of goods and materials	
Costs of the products, goods and materials sold	– manufacturing costs of products sold – value of goods and materials sold	
Gross profit (loss) from sales		
Cost of sales		yes
General administrative expenses		partially
Profit (loss) on sales		
Other operating income	– profit on disposal of non-financial fixed assets – subsidies – other operating income	
Other operating expenses	– loss on disposal of non-financial fixed assets – impairment loss on non-financial fixed assets – other operating expenses	partially
Operating profit (loss)		
Financial income	– dividends and shares profit – interest – profit on disposal of investments – investment regulation – other	
Financial expenses	– interest – loss on disposal of investments – impairment loss on investments – other	
Profit (loss) on ordinary activities		
Result of extraordinary events[a]	– extraordinary gains – extraordinary losses	
Gross profit (loss)		
Income tax		partially
Other compulsory charges decreasing the profit (increasing the loss)		
Net profit		yes

Source: Based on (Gabrusewicz & Samelak, 2009; Ustawa o Rachunkowości, 1994).

chapter refers to the structure of the profit and loss account that was in force before the amendment in question entered into force.

sible that the excluded costs hide some partial transaction costs, e.g. exchange rate differences. However, assessing them by consulting financial statements is not feasible, therefore the obtained value is rather a *proxy* of transaction costs rather than an exact value. Overall, transaction costs include costs related to contract execution, transaction organisation and the contract risk premium (Table 3.7).

Of course, one can also look for other categories of transaction costs, such as the cost associated with an alternative form of transaction execution. However, referring to Fischer's (1977) suggestion, this way everything can be labelled a transactional cost, and the concept loses its meaning.

Although the profit and loss account by function outlines relatively clear breakdown of costs, it is unfortunately rarely used. In practice, companies most often prepare their statement by nature, which is the result of statutory requirements. The attempt to delimitate transaction costs in such statements is much more complex (Table 3.8).

Table 3.8. Profit and loss account and transaction costs of the company–by nature

Statement position	Includes	Transaction costs
Net proceeds from sales and equivalents	– net proceeds from sales of products – change in stocks of products – manufacturing cost of goods for the undertaking's own purposes – net proceeds from sales of goods and materials	
Operating expenses	– depreciation and amortisation – consumption of materials and energy – third party services – taxes and charges – salaries – social security and other benefits – other sundry expenses – value of goods and materials sold	partially partially yes yes partially partially yes
Profit (loss) on sales		
Other operating income	– profit on disposal of non-financial fixed assets – subsidies – other operating income	
Other operating expenses	– loss on disposal of non-financial fixed assets – impairment loss on non-financial fixed assets – other operating expenses	partially

Statement position	Includes	Transaction costs
Operating income (loss)		
Financial income	– dividend and share profits – interest – profit on disposal of investments – investment revaluation – other	
Financial expenses	– interest – loss on disposal of investments – impairment loss on investments – other	
Profit (loss) on ordinary activities		
Result of extraordinary events	– extraordinary gains – extraordinary losses	
Gross profit (loss)		
Income tax		partially
Other compulsory charges decreasing the profit (increasing the loss)		
Net profit		yes

Source: Based on (Gabrusewicz & Samelak, 2009; Ustawa o Rachunkowości, 1994).

Most transaction costs are "hidden" in operating expenses. The problem is that both production and non-production related costs (or service and non-service costs) are combined here. Therefore, an additional internal division into these two areas of business activity is necessary. It mainly concerns the cost of consumables used, the depreciation of non-production assets and employee benefits. Unfortunately, accounting assessments of profit and loss in the usual form are most likely to deviate from the actual transaction costs values.

Due to the abovementioned constraints, it was necessary to consider the value of transaction costs compared to non-transactional ones. Being aware of the fact that entities differ in their cost structure not only between industries, but even within particular industries, companies with different characteristics were contacted in order to establish this relationship. The sample selected for this analysis was deliberate and unrepresentative; however, it included all the sections taken into analysis: companies of different size as well as diversified in terms of ownership and profitability. Information on the type and value of costs in the cross-section breakdown between 2007 and 2015 was collected from February 2016 to December 2017. Based on the data collected every section was afterwards

assigned a ratio used to assess the level of transaction costs. The author is aware that the value for an industry level of transaction costs is not *de facto* an actual level of transaction costs, but just a proxy measure. However, to the author's best knowledge other studies–regardless of the adopted micro-, meso- or macroperspective–have so far also failed to assess the exact value of these costs. Moreover, given the previously mentioned definitional inconsistencies, the complexity of research units and the limitations in data availability–the assumption that one can aim to establish *an exact* value is rather unrealistic.

3.4. Research limitations

Research limitations mean there are incidents and circumstances occurring in the study that remain out of the researcher's control. As with all studies, the one presented here also includes some constrains that arise from its various presumptions. When interpreting the results presented in Chapter Five, one should bear in mind the limitations resulting from the methods used, as well as certain circumstances presented below.

Firstly, as indicated in the Chapter One, the definition and delimitation of the industry concept remain problematic. Here, the activity-based criterion was used, and the industry is understood as a class according to the PKD 2007 classification. The rationale for this approach has been presented earlier and will not be discussed again, but it should be noted that the use of another breakdown criterion (e.g. outcome-based) could cause the results–both in terms of assessing the degree of internationalisation and the determinants of industry internationalisation–to be different. This does not prejudge, "invalidate" or show error in any way regarding the applied research procedure, but only indicates the sensitivity of the results to the way the concepts are operationalised.

Staying with the topic of the limitations resulting from the applied definitions, it is worth mentioning the issue of variable operationalisation. One of the constructs used in the work is an innovative approach to measuring transaction costs based on Coase's concept (1990). It refers to the costs included in the financial statements of companies. Since the reports include data already aggregated to a certain degree, "digging out" information that is not directly and straightforwardly presented in the statements entails a certain risk of error. In the case of estimating transaction costs this risk verges on certain knowledge, especially as the distribution of these costs may be slightly different depending on the industry. However, similar simplifications were used for the estimations done by Wallis and North, who assessed the value of transaction sectors in the

United States. Controlling for the values obtained, a sample of industries was selected where actual transaction costs were calculated.[49] The details of the control sample are presented in Appendix 4. Verification showed that the estimated transaction costs error level fell below the threshold of 17%. The control sample was not representative, however, and obtaining data and calculating values for the 244 industries considered in this study is an impossible task.

Another limitation, which particularly bothers the author, is the inability to capture the geographical dimension of the industry internationalisation process. The choice of an activity-based criterion for industry delimitation means accepting the lack of a dataset on the foreign expansion directions of industries. Such data is available in an outcome-based approach; however, transferring one approach to the other is an insurmountable task. Hence, the proposed measure for the degree of industry internationalisation touches upon the scope, intensity and mode of foreign expansion but refrains from including the width of internationalisation.

An important issue is also the weights used for crafting the measure for the degree of internationalisation. Although here, in the case of this particular study, this aspect does not–according to the author–constitute any limitation, it may become one when transferring the measure to other studies. The weights set here are not dependent on the industry type (production or non-production). This is dictated by the research aim which was meant to compare the degree of internationalisation achieved across different industries. Therefore respondents were asked to bear in mind the fact that the construct was to be a universal measure. However, as the literature review indicates, the internationalisation of service industries often has a slightly different character and path than production industries. Accordingly, when concentrating only on specific type of industries, it may be necessary to modify the weights.

The last limitation of the present research is the tools used in the work. The original intention of the author was data triangulation, meaning the use of various methods in obtaining information for the study. However, the complexity of the phenomenon under study and the number of research items made it impossible to include qualitative methods. Gaining full information on all industries registered in Poland with use of primary data is improbable. Moreover, the author's personal negative experiences in assessing the perception of a phenomenon by entrepreneurs (especially in terms of transaction costs) strengthened her decision to apply only secondary data. Although primary data undoubtedly enriches

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[49] The "exact" value of transaction costs was calculated based on the data presented by companies–industry members–and then aggregated to the industry level. However, given the fact that there is no consensus what exactly is and what is not transaction costs–even such a measurement can be questioned. Nevertheless, the author applied the criteria presented in subchapter 3.4.2 and established the values accordingly.

a researcher's knowledge as to certain non-quantifiable aspects of the interna-
tionalisation process–the author leaves such extension to the occasion of further
research in this area.

Summary

Transferring the concept of internationalisation to the industry level and cre-
ating a research scheme covering the relationship between the internationalisa-
tion process and its potential determinants posed a great challenge for the author.
First, the development of measures that would take into account all the dimen-
sions of the phenomenon, and at the same time would address the largest pos-
sible number of industries, was problematic due to the limited data availability.
However, eventually, it was possible to propose an indicator that allowed for
estimating the degree of internationalisation of as many as 532 industries in the
Polish economy (Appendix 5) and which focuses on the intensity, scope and
modes of company foreign expansion.

Of particular significance here is the theoretical framework that provides as-
sumptions for the constructed research scheme. The study adopts the assump-
tions of the new institutional economics, and among the determinants of the de-
gree of industry internationalisation, the significance of the level of transaction
cost is emphasised. The other potential factors affecting this degree refer to the
determinants of company internationalisation–more on the matter can be found
in Chapter Two. The potential determinants were afterwards cross-referenced
with the forces of industry globalisation according to Yip (1989). The scheme
constitutes the basis for the analysis made in the remainder of the publication.

4. The impact of the economic crisis on the macroeconomic and industry situation in Poland

The economic crisis that began with the bursting of the speculative bubble in the real estate market in the United States in 2007 very quickly spread to Europe. Already in 2008 the financial institutions had to bear the consequences of these events, and soon afterwards a definite deterioration in the economic conditions–not only in financial markets–could be observed (European Commission, 2009). Initially, it was strongly believed that the European economy–which was based on export revenues and a strong position of companies and individual house-holds–would easily resist the turbulence in the financial markets. This erroneous assessment was overturned at the end of 2008 when Lehman Brothers declared bankruptcy, causing panic in the financial and stock markets.

The functioning of a market economy is inextricably linked to fluctuations in economic activity, which in practice means the inevitable occurrence of both periodical recessions and times of prosperity (Gorynia & Mroczek-Dąbrowska, 2017). Business cycles have different patterns and are caused by different factors. Although their existence is well known to both economists and entrepreneurs, the actual appearance of a crisis in the economy seems to always come as a surprise. As the research aims to study the impact of the latest economic crisis on the degree of industry internationalisation in Poland, the following chapter discusses the performance of Poland against other European countries at the time. It then continues with analyses of Polish industries.

4.1. Europe's developmental indicators between 2007 and 2015

Europe, as a member of global financial and commercial markets, quickly felt the effects of global overliquidity. There were three basic channels through which changes were transferred. The first one was related to the pressure on European exchange rates related directly to changes in the US dollar exchange rate, and indirectly also to the Chinese renminbi and Japanese yen. Another source

proved to be borrowers with liabilities in the currencies of those countries where interest rates and the costs of servicing liabilities were favourable at the time. These contributed to the "overflowing" of a global overliquidity of capital to European countries. Thirdly, the liberalisation of capital markets allowed the free flow of capital to countries in which a significant increase in *per capita* income was observed. A significant part of this capital was invested in the real estate market, which was greatly affected by financial turbulence (Berger & Hajes, 2009; Boone & van den Noord, 2008; Dreger & Wolters, 2009).

Shortly after, the fluctuations in the financial markets were also transferred to other economic spheres, causing significant changes in macroeconomic indicators. Table 4.1 presents the value of exports of goods for selected European countries before and after the crisis. Comparing the year-to-year values, the most significant decreases were recorded in 2009, therefore at a time when the effects of the financial crisis began to be observable in Europe.[50] The greatest declines, of about 20%, were seen in Finland and Estonia, whilst the only increase was reported by Iceland. Starting in 2010, each European country started on a path to quickly return to the situation before the economic crisis. Most of the economies managed to reach this level by 2011, and only in Norway did the process take until 2015.

Table 4.1. The value of exports of goods in billion US$ (fixed prices 2010) for selected European countries between 2007 and 2015

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015
Belgium	363.70	369.92	335.04	369.67	394.50	395.83	399.35	420.05	433.84
Croatia	24.50	24.69	21.21	22.52	23.02	22.99	23.71	25.14	27.50
Cyprus	12.89	12.81	12.29	12.84	13.56	13.19	13.46	14.04	14.92
Czech Republic	127.12	132.50	119.48	137.00	149.55	155.95	156.24	169.76	179.98
Denmark	167.60	174.09	158.04	162.68	174.39	176.41	179.26	184.86	189.20
Estonia	14.67	14.80	11.80	14.63	18.17	19.05	19.57	20.06	19.93
Finland	105.98	112.96	90.27	95.84	97.75	98.96	100.06	97.34	98.16
France	710.03	712.60	632.31	689.32	736.74	755.45	769.87	795.37	829.30
Germany	1442.44	1470.30	1260.53	1443.74	1563.28	1607.45	1635.03	1710.83	1800.34
Greece	74.84	77.44	63.10	66.17	66.18	66.96	67.97	73.24	75.50
Hungary	101.62	108.64	96.25	107.13	114.15	112.10	116.79	127.40	138.24
Iceland	6.30	6.51	7.04	7.11	7.36	7.62	8.13	8.39	9.16
Ireland	214.95	206.77	216.38	228.86	236.08	239.81	247.12	282.77	391.34
Italy	602.94	584.30	478.83	535.26	563.02	576.11	580.14	595.92	622.22

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[50] This work assumes that "an economic crisis involves at least a one-year annualised decrease in the real GDP value and in other indicators of the economic situation" (Dzikowska & Trąpczyński, 2017, p. 44).

Table 4.1 – cont.

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015
Lithuania	20.60	23.38	20.39	24.26	27.99	31.46	34.56	35.69	35.56
Luxem-bourg	90.29	95.23	84.14	92.87	96.62	99.28	104.51	119.12	127.29
Malta	10.54	12.59	12.53	13.40	13.62	14.61	14.78	15.36	16.00
Netherlands	586.90	597.66	544.45	601.82	628.32	652.16	666.03	695.67	740.70
Norway	176.55	176.78	169.53	170.47	169.08	171.74	168.89	174.10	182.32
Poland	168.61	180.51	169.78	191.97	207.06	216.55	229.72	245.06	263.91
Portugal	72.62	72.39	65.00	71.19	76.20	78.79	84.30	87.95	93.35
Slovakia	68.84	70.92	59.03	68.32	76.52	83.65	89.22	92.69	98.62
Slovenia	32.25	33.59	28.02	30.87	32.99	33.19	34.20	36.15	37.96
Spain	378.44	375.24	333.88	365.34	392.40	396.57	413.56	431.30	449.39
Sweden	231.04	235.63	201.49	225.56	239.32	241.67	239.80	252.41	266.76
Switzerland	353.91	367.57	330.93	373.42	391.75	396.04	456.23	428.14	438.46
United Kingdom	707.95	712.05	650.20	688.75	731.69	733.36	739.52	759.15	796.90
Euro area	5016.68	5061.50	4434.06	4936.14	5259.14	5392.59	5505.14	5760.80	6130.01
European Union	6620.43	6705.26	5920.46	6551.41	6987.63	7142.11	7295.54	7636.84	8110.26

Source: Based on OECD (n.d. (a)) (accessed 27.02.2018).

Some of the basic indicators of a country's economic development are the GDP measures (Table 4.2). Again in 2009, almost all countries recorded a decline in both total GDP and GDP per capita. The only exception was Poland, which recorded a growth of 0.3% and 0.2% respectively. Again the highest decline, of approximately 17%, concerned Estonia and Lithuania. By 2014, almost all European countries had managed to achieve their pre-crisis GDP level; however, the process was slower than in the case of the exports. In this respect Greece is in the worst situation as its ratio is still more than 20% lower than in 2006 and 2007. By 2015 Portugal, Cyprus, Italy and Spain had not yet reached their pre-crisis levels either.

Another very often referred to measure of economic and social development is the unemployment rate. The first weakening of the labour market was already visible in 2008, but the problems deepened in 2009 (Table 4.3). Until 2007 European Union countries had sought to achieve the objectives set in the Lisbon Strategy, which meant achieving an overall employment level of 70% of society (European Commission, 2009). The European Union was close to implementing this, reaching an employment level of 68%, thanks especially to the professional activation of women and the elderly. The current level for the rate of unemployment results from the economic crisis, the consequences of which are still visible. In most

Table 4.2. GDP values of selected European countries between 2007 and 2015

Country		2007	2008	2009	2010	2011	2012	2013	2014	2015
Belgium	A[a]	477.7	481.5	470.6	483.6	492.2	493.4	494.4	501.1	508.1
	B[b]	44960.8	44956.4	43591.3	44380.2	44556.0	44337.6	44209.7	44702.3	45068.3
Croatia	A[a]	64.2	65.5	60.7	59.7	59.5	58.2	57.6	57.3	58.6
	B[b]	14476.7	14778.9	13704.4	13505.8	13899.3	13636.9	13529.4	13517.8	13936.0
Cyprus	A[a]	24.7	25.7	25.2	25.6	25.6	24.9	23.4	23.1	23.5
	B[b]	32236.6	32651.9	31223.6	30818.5	30138.6	28775.1	27130.6	27045.8	27738.5
Czech Republic	A[a]	207.5	213.1	202.9	207.5	211.2	209.5	208.5	214.1	225.5
	B[b]	20151.2	20520.8	19424.3	19808.1	20118.6	19929.8	19826.8	20343.7	21381.7
Denmark	A[a]	334.1	332.4	316.1	322.0	326.3	327.0	330.1	335.4	340.8
	B[b]	61174.6	60504.8	57229.1	58041.4	58575.6	58487.8	58788.1	59437.9	59967.7
Estonia	A[a]	23.6	22.4	19.1	19.5	21.0	21.9	22.3	22.9	23.3
	B[b]	17627.0	16716.5	14282.6	14638.6	15798.6	16538.2	16918.6	17453.4	17734.0
Finland	A[a]	260.4	262.3	240.6	247.8	254.2	250.6	248.7	247.1	247.1
	B[b]	49239.2	49363.7	45065.8	46202.4	47171.0	46277.6	45715.7	45239.4	45086.7
France	A[a]	2669.3	2674.5	2595.8	2646.8	2701.9	2706.8	2722.4	2748.2	2777.5
	B[b]	41696.7	41545.3	40116.4	40703.4	41349.2	41224.7	41249.5	41431.0	41689.7
Germany	A[a]	3441.4	3478.6	3283.1	3417.1	3542.2	3559.6	3577.0	3646.0	3709.6
	B[b]	41831.9	42365.1	40086.1	41785.6	44125.3	44259.3	44354.7	45022.6	45412.6
Greece	A[a]	332.1	331.0	316.7	299.4	272.0	252.2	244.0	245.8	245.1
	B[b]	30054.9	29874.7	28514.8	26917.8	24495.7	22830.5	22251.3	22565.7	22648.8
Hungary	A[a]	138.0	139.2	130.0	130.9	133.1	130.9	133.7	139.3	144.0
	B[b]	13727.7	13869.4	12974.1	13092.2	13347.6	13196.2	13509.9	14119.1	14629.2
Iceland	A[a]	14.6	14.8	13.7	13.3	13.5	13.7	14.3	14.6	15.2
	B[b]	46695.2	46531.3	43152.7	41676.5	42375.0	42663.3	44126.0	44477.9	45820.1

Table 42 – cont.

Country		2007	2008	2009	2010	2011	2012	2013	2014	2015
Ireland	A[a]	238.0	228.6	218.0	222.0	228.6	228.7	232.4	251.8	316.1
	B[b]	54096.3	50918.4	48071.7	48671.9	49942.5	49851.0	50542.4	54527.3	68030.9
Italy	A[a]	2234.5	2211.0	2089.8	2125.1	2137.3	2077.1	2041.2	2043.5	2063.9
	B[b]	38236.8	37585.3	35363.4	35849.4	35994.1	34885.3	33887.3	33616.0	33984.1
Lithuania	A[a]	41.8	42.9	36.5	37.1	39.4	40.9	42.3	43.8	44.6
	B[b]	12928.3	13405.2	11546.8	11984.9	13000.2	13681.0	14304.8	14932.6	15341.8
Luxembourg	A[a]	53.7	53.1	50.7	53.2	54.6	54.4	56.4	59.6	61.3
	B[b]	111968.4	108577.4	101939.6	104965.3	105264.8	102404.6	103721.8	107152.9	107648.6
Malta	A[a]	8.4	8.7	8.4	8.7	8.9	9.1	9.5	10.3	11.0
	B[b]	20591.0	21142.0	20466.6	21087.8	21296.3	21685.3	22471.6	24080.2	25511.5
Netherlands	A[a]	842.8	857.1	824.8	836.4	850.3	841.3	839.7	851.6	870.9
	B[b]	51447.3	52118.1	49897.2	50338.3	50937.6	50213.0	49969.9	50497.2	51410.5
Norway	A[a]	431.4	433.5	426.2	429.1	433.3	445.1	449.7	458.6	467.7
	B[b]	91617.3	90917.5	88260.0	87770.3	87481.2	88689.5	88538.7	89275.0	90104.1
Poland	A[a]	431.6	449.9	462.6	479.3	503.3	511.4	518.5	535.5	556.1
	B[b]	11320.6	11800.0	12124.6	12597.9	13222.8	13435.5	13630.7	14088.8	14640.2
Portugal	A[a]	240.6	241.0	233.9	238.3	234.0	224.5	222.0	224.0	228.1
	B[b]	22817.3	22829.9	22128.9	22538.7	22159.5	21353.2	21228.1	21533.5	22016.8
Slovakia	A[a]	85.3	90.1	85.2	89.5	92.0	93.6	94.9	97.6	101.3
	B[b]	15868.8	16747.8	15818.6	16600.6	17046.6	17299.6	17538.7	18003.5	18678.9
Slovenia	A[a]	49.8	51.4	47.4	48.0	48.3	47.0	46.5	47.9	49.0
	B[b]	24673.4	25447.4	23252.1	23437.5	23540.7	22864.2	22574.7	23224.4	23731.2
Spain	A[a]	1468.1	1484.5	1431.4	1431.6	1417.3	1375.8	1352.4	1371.0	1418.1
	B[b]	32459.9	32303.2	30874.1	30736.6	30321.7	29414.9	29008.0	29496.4	30532.5

Sweden	A^a	488.7	486.0	460.8	488.4	501.4	500.0	506.2	519.3	542.8
	B^b	53421.0	52711.2	49554.3	52076.3	53061.6	52519.7	52722.9	53561.9	55395.1
Switzerland	A^a	567.4	579.7	566.8	583.8	593.7	599.6	610.7	625.7	633.4
	B^b	75143.7	75793.6	73189.2	74605.7	75029.8	74984.1	75499.7	76410.9	76472.5
United Kingdom	A^a	2517.3	2505.4	2400.5	2441.2	2476.6	2513.3	2564.9	2643.2	2705.3
	B^b	41050.4	40536.1	38545.9	38893.0	39150.8	39455.4	39996.5	40908.8	41536.9
Euro area	A^a	12915.6	12972.7	12386.7	12645.3	12847.9	12733.8	12702.8	12871.7	13139.6
	B^b	38826.9	38808.6	36935.4	37617.7	38303.1	37879.2	37660.5	38033.6	38704.5
European Union	A^a	17315.0	17398.3	16639.5	16992.7	17280.6	17206.5	17251.1	17551.1	17957.0
	B^b	34635.8	34671.2	33059.6	33687.6	34286.1	34065.2	34053.2	34538.6	35232.5

A – GDP (constant 2010 US$ bn).
B – GDP per capita (constant 2010 US$).
Source: Based on OECD (n.d. (b)) (accessed 27.02.2018).

of the analysed cases the unemployment rate has not yet dropped to the levels for the years 2006 or 2007. The most difficult situations were faced by Greece (24.9%) where the increase in the unemployment rate in comparison to 2007 was over 16 pp; Spain (22.1%) which also had to deal with an almost 14 pp increase; and Cyprus (14.9%) with an increase of 11 pp. Poland and Germany were not subject to these labour market trends and their unemployment rate was visibly decreasing. Poland hit its lowest rate in 2008 (7.1%), though subsequent years saw an increase to over 10% before finally falling to a level of 7.5% in 2015. The German case–surprisingly–was entirely unique, as in the entire period analysed the unemployment level kept declining from 8.7% in 2007 to 4.6% in 2015.

Table 4.3. Unemployment rate in selected European countries between 2007 and 2015

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015
Belgium	7.5	7	7.9	8.3	7.1	7.5	8.4	8.5	8.5
Croatia	9.9	8.5	9.2	11.6	13.7	15.9	17.3	17.3	16.3
Cyprus	3.9	3.7	5.4	6.3	7.9	11.8	15.9	16.1	14.9
Czech Republic	5.3	4.4	6.7	7.3	6.7	7	7	6.1	5
Denmark	3.8	3.4	6	7.5	7.6	7.5	7	6.6	6.2
Estonia	4.6	5.5	13.5	16.7	12.3	10	8.6	7.4	6.2
Finland	6.9	6.4	8.2	8.4	7.8	7.7	8.2	8.7	9.4
France	8.1	7.5	9.1	9.3	9.2	9.8	10.4	10.3	10.4
Germany	8.7	7.5	7.7	7	5.8	5.4	5.2	5	4.6
Greece	8.4	7.8	9.6	12.7	17.9	24.4	27.5	26.5	24.9
Hungary	7.4	7.8	10	11.2	11	11	10.2	7.7	6.8
Iceland	2.3	2.9	7.2	7.6	7	6	5.4	4.9	4
Ireland	4.7	6.4	12	13.9	14.6	14.7	13	11.3	9.4
Italy	6.1	6.7	7.7	8.4	8.4	10.7	12.1	12.7	11.9
Lithuania	4.2	5.8	13.8	17.8	15.4	13.4	11.8	10.7	9.1
Luxembourg	4.1	5.1	5.1	4.4	4.9	5.1	5.8	5.9	6.7
Malta	6.5	6	6.9	6.8	6.4	6.3	6.4	5.8	5.4
Netherlands	3.2	2.8	3.4	4.4	5	5.8	7.2	7.4	6.9
Norway	2.5	2.6	3.1	3.5	3.2	3.1	3.4	3.5	4.3
Poland	9.6	7.1	8.2	9.6	9.6	10.1	10.3	9	7.5
Portugal	8	7.6	9.4	10.8	12.7	15.5	16.2	13.9	12.4
Slovakia	11.1	9.5	12	14.4	13.6	14	14.2	13.2	11.5

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015
Slovenia	4.8	4.4	5.9	7.2	8.2	8.8	10.1	9.7	9
Spain	8.2	11.3	17.9	19.9	21.4	24.8	26.1	24.4	22.1
Sweden	6.2	6.2	8.4	8.6	7.8	8	8.1	8	7.4
Switzerland	3.7	3.4	4.1	4.5	4	4.2	4.4	4.5	4.5
United Kingdom	5.3	5.6	7.5	7.8	8	7.9	7.5	6.1	5.3

Source: Based on OECD (n.d. (c)) (accessed 4.12.2015).

It is also worth noting that 2009 was a particularly difficult year for the European Union when it comes to indicators of economic development. Comparing measurements on a global scale, one could conclude that Europe was affected by a regional crisis (Dzikowska & Trąpczyński, 2017), though the lasting effects of the crisis in individual countries varied.

Since an analysis of each single development measure in assessing the impact of the crisis on the situation in Europe is tedious and does not give unambiguous answers, it is still worth using synthetic measures in such evaluations. Dzikowska, Gorynia and Jankowska (2017) created a ranking on the basis of which it is possible to assess to what extent individual economies experienced significant slowdowns in 2009 and which of them showed the greatest difficulties in returning to their pre-crisis performance (Figure 4.1)

		During the economic crisis	
		Heavily exposed	Weakly exposed
Directly after the economic crisis	Difficulties in overcoming the effects of the crisis	Austria, Canada, Denmark, Finland, France, Greece, Iceland, Ireland, Italy, Japan, the Netherlands, Portugal, Spain, UK	Belgium, Norway
	Ease in overcoming the effects of the crisis	El Salvador, Estonia, Mexico, Russia, Singapore, Sweden, Turkey, USA	Australia, Chile, Columbia, the Czech Republic, Egypt, Germany, Hong Kong, Israel, Jordan, Kazakhstan, Malaysia, Morocco, New Zealand, Peru, Poland, South Korea, Switzerland, Thailand,

Figure 4.1. European economies compared with the rest of the world during and after the economic crisis

Items assigned to groups on the basis of the equal span formula.
Classification shown in alphabetical order, not by indicator value.
Source: Based on (Dzikowska et al., 2017, p. 141).

As easily noted and what has already been highlighted before, Europe found itself in a difficult position both during and after the economic crisis. Most economies have experienced considerable difficulties in returning to their pre-crisis situation. Only a few countries that experienced a significant slowdown in 2009 managed to quickly reclaim their previous position (Estonia, Sweden). On the other hand, Poland and the Czech Republic were countries considered to be relatively the least exposed to the effects of the slowdown and therefore not affected by its consequences in the long run. While this is proved by their performance, the indicators also imply a significant distinction between the two countries. Poland was indeed the least affected by the crisis in Europe and was relatively quick in rebuilding its pre-crisis image. Another interesting case is Norway. From a multivariate assessment the country cannot be considered an economy strongly affected by the economic crisis. However, even the rather moderate impact of the crisis had its long-term consequences and Norway belongs to the group of countries that did not fully recover from its effects.[51]

More detailed results of the analysis are shown in Chart 4.1. As easily observable, the country that has been severely hit by the crisis and which is still experiencing adjustment problems is Greece. The reasons behind this situation can be sought in the existence of a shadow economy (20-25% of GDP), an inefficient industrial sector, imperfections in the institutional environment and high public debt (Mitsakis, 2014; Markantonatou, 2013). The "inverse" of Greece is Estonia, which during the crisis recorded a deterioration of its economic situation, though in subsequent years showed significant improvements in most dimensions of socio-economic life.

4.2. The impact of the economic crisis on Poland

In the years 2006 and 2007, despite the symptoms of the crisis experienced abroad, the Polish economy grew at a rate of 6% per year. Further analysis indicates that only in the fourth quarter of 2008 Poland experienced a decline with a growth rate of –0.3%. The indicators presented in subchapter 4.1 clearly show that Poland did not find itself in a most difficult economic situation either during the crisis or directly afterwards. Since Poland was the only country in Europe reporting growth at that time, the country was labelled a "green island". However, although the scale of the impact of the crisis on Poland was smaller compared to

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[51] Theoretically, Belgium was in a similar situation, but the values of its indicators were on the border of belonging to the group of countries significantly affected by the crisis (the value for Belgium amounted to 59.4, with a grouping threshold of 59.89).
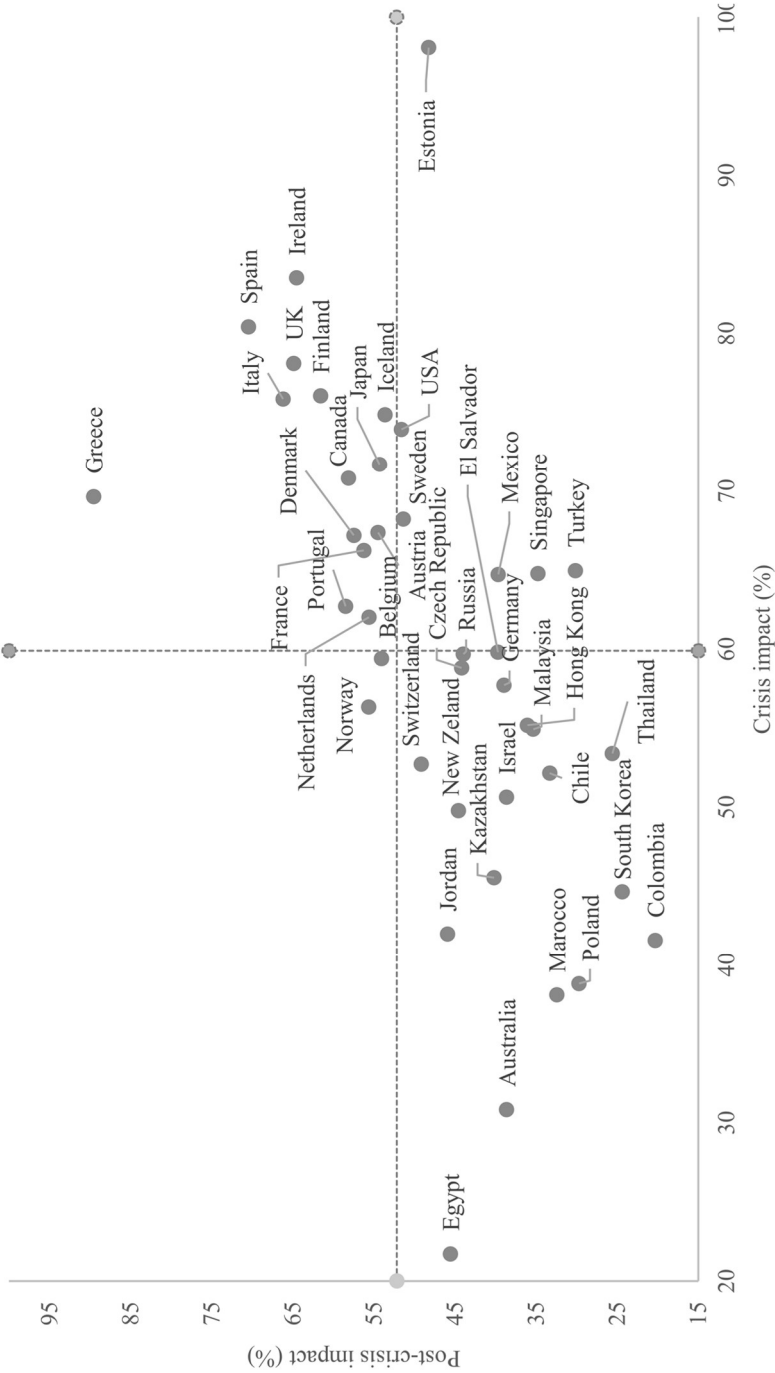
Chart 4.1. Situation of economies during and after the global economic crisis

Source: Based on (Dzikowska et al., 2017, p. 141).

other countries, it does not mean that symptoms of the economic slowdown did not occur at all.

Gradzewicz, Growiec, Kolasa, Postek and Strzelecki (2014) argue that the main reason for the increase stems from capital accumulation combined with adjustments in the labour market. Capital investments in Poland originate mostly from European funds, whose long-term nature guaranteed the continuity of investment projects. The adjustments in the labour market were mainly limited to a reduction in the number of working hours and were temporary rather than permanent. Drozdowicz-Bieć (2011, p. 41) looks somewhat differently at this phenomenon, indicating especially the relatively low share of loans in financing business and consumption, the country's increasing competitiveness in the years preceding the crisis, the relatively low level of openness in the economy, the inflow of investment funds from the Union European, the floating exchange rate, the existence of a shadow economy, and the government's reluctance to create and implement stabilisation packages. As the author indicates, the mortgage loan market in Poland did not exhibit speculative features, i.e. the system of granting loans was transparent and did not show any abuse (Drozdowicz-Bieć, 2011). Zelek (2011b) indicates that an economic policy focused on the growth of consumer spending and the increase in export sales enabled a smooth comeback to the pre-crisis situation. This is somewhat contradictory to the insights of Drozdowicz-Bieć (2011), who emphasises that it was Poland's relatively small dependence on exports[52] that cushioned the impact of the crisis on the country. Cross-referencing these observations with data on Polish exports broken down into sections (Table 4.4), the following can be concluded:

– most sections of the economy were indeed not very dependent on export sales, with the main exceptions being Section B (Mining and Quarrying) and Section C (Manufacturing),
– Sections B and C employ ca. 40% of the total people employed in Poland and account for about 30% of registered business entities, thus they remain a vital part of the economy,
– in the entire period analysed, including the time of the economic crisis, no significant changes in the value and share of exports within total sales revenues are noted.

The symptoms of economic slowdown and fear of the unknown caused some companies in Poland to implement adaptation strategies (Kania, Mroczek--Dąbrowska, & Trąpczyński, 2017, pp. 155-172). As indicated by Zelek and Maniak (2011) and Orłowski, Pasternak, Flaht and Szubert (2010) defensive atti-

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[52] Drozdowicz-Bieć (2011) reports that Poland's GDP in 2007-2009 was approximately 40% from sales to foreign markets, while in Hungary this ratio amounted to ca. 80%, in Slovakia to 86%, in the Czech Republic to 76%, and in Lithuania to 55%. Poland displayed less "need" for pro-export activities due to the absorptive domestic market.

Table 4.4. Share of export revenues in total revenues–divided into sections of PKD 2007 between 2007 and 2015

Section	2007	2008	2009	2010	2011	2012	2013	2014	2015
	(%)								
A	4	4	6	6	5	6	7	6	8
B	20	19	20	26	26	31	33	29	28
C	35	35	36	37	38	39	41	41	42
D	1	1	1	1	1	2	2	2	1
E	3	3	3	6	6	6	6	5	5
F	5	4	3	4	4	4	5	4	4
G	6	6	5	6	5	6	7	7	7
H	19	16	18	18	17	17	20	21	19
I	1	1	1	1	1	1	2	1	1
J	6	5	6	6	7	8	9	11	12
K	0	0	2	2	2	3	2	3	2
L	0	0	0	1	2	2	1	1	1
M	13	14	11	12	13	14	19	20	20
N	4	3	3	8	8	8	8	9	9
O	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P	1	7	0	3	2	2	3	2	1
Q	0	0	2	2	1	1	1	1	2
R	0	0	0	0	0	0	0	0	0
S	7	9	11	19	21	24	24	19	19
T	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
U	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

n/a – data not available.
Source: Based on the PontInfo Gospodarka database (accessed 22.06.2016).

tudes prevailed among the SME sector, and their strategies focused, among other things, on reducing costs, activities and employment, as well as rationalising their product and market portfolio.

While it is quite obvious that the economic crisis had a much smaller impact on the economic situation of Poland than other European economies, some researchers (e.g. Gradzewicz et al., 2014) claim that it is dangerous to prejudge the existence of such a dependency at all. In their opinion, there are no lasting effects of the crisis on the country's development measured, for example, by *capacity utilisation* or *total factor productivity*. However, it should be remembered that due to the relatively short time that has elapsed since the beginning of the crisis, these results could change by 2020 in various ways:
– Poland may fall into the middle income trap (Aiyar, Duval, Puy, Wu, & Zhang, 2013) slowing down convergence towards more developed countries,

– the impact of the crisis may be revealed in other indicators than the ones evoked (e.g. permanent unemployment rate),
– the impact of the crisis may not be noticeable at the macroeconomic level but at the industry level, which may be overlooked when analysing the aggregated data.

4.3. The situation of Polish industries during and after the crisis

This subchapter presents a reproduction of quantitative research on the impact the economic crisis exerted on the standing of Polish industries (Dzikowska et al., 2017, pp. 146-157). The original research was carried out on GUS data and was conducted at both the macroeconomic and the mesoeconomic level. The replication of this research at the industry level is aimed at supplying more detailed results as it covers all sections of economic activity (not only section C as in the primary research), and does not refer to divisions but to classes (here understood as industries) according to PKD 2007 standards. Two changes were applied compared to the original survey: the year 2009 was chosen as the year of the economic crisis; and the year 2011[53] instead 2012 is referred to as the prosperity year. The purpose of these changes was to verify how quickly individual industries managed to overcome the negative effects of the crisis.

Industry ranking is based on a multivariate measure including the following items (Dzikowska et al., 2017, p. 147):
– number of employees, in thousands,
– revenues from total activities, in millions of zlotys,
– net value of fixed assets, in millions of zlotys,
– capital expenditures, in millions of zlotys,
– net financial performance, in millions of zlotys.

These indicators reflect the scale of operations, an industry's performance and its development potential. Variables are transformed as a percentage deviation from the baseline (2007 is treated as the point of reference), but only in the case of the net financial result as a difference in relation to the baseline.[54] The analysis was carried out for 338 activity classes[55] due to a lack of or incomplete

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[53] In 2011 Poland's economic growth was robust and the unemployment rate was low and stable.

[54] Due to the negative net financial results achieved in some industries.

[55] In some cases groups were used instead of classes, since not all economic activities are broken down into classes.

information in the case of the remaining industries. The study covers 154 production industries, 167 service industries and 17 industries classified as other.

In order to create a synthetic measure, the coefficient of variation of individual variables is revised, which in each case exceeds the threshold of 0.2. Variables are considered destimulants, thus they are transformed and standardised.

As a result of having created the rankings, it is possible to state which industries were most strongly/weakly affected by economic turbulence (2009) and which industries recorded the largest/smallest problems with returning to the situation before the economic crisis (2011). Analysis of the data at the class level rather than group level allows for determining whether there is a significant differentiation within the sample, and the additional inclusion of non-production industries builds a more complete overview of the entire economy. Tables 4.5 and 4.7 present the rankings for the situation during and after the crisis respectively. The higher the indicator value (between 0 and 1), the greater is the impact of the crisis or the difficulties of adjustment.

Table 4.5. Activity ranking during the economic crisis–selected industries

No.	PKD	Impact	No.	PKD	Impact
1	24.10	0.94	329	82.99	0.68
2	73.12	0.90	330	42.12	0.67
3	10.42	0.87	331	35.14	0.66
4	24.42	0.86	332	95.21	0.65
5	24.34	0.86	333	23.11	0.63
6	24.44	0.86	334	66.22	0.61
7	20.60	0.86	335	46.11	0.59
8	28.91	0.85	336	64.99	0.31
9	28.49	0.85	337	28.96	0.30
10	13.20	0.85	338	01.19	0.26

Full industry listing can be found in Appendix 6.
Source: Based on the PontInfo Gospodarka database (accessed 22.06.2016).

The industries most affected by the crisis were those manufacturing basic iron and steel as well as ferro-alloys. Overall, the manufacture of basic metals turned out to be severely impacted by the crisis (items 1, 4, 5, 6), which coincides with the results of analysis at group-level (Dzikowska et al., 2017). However, cast iron (24.51, see Appendix 6) for example is in 84th position with a score of 0.82, which suggests that the industry dealt with the crisis much better than the other industries in the same group. The growing of various non-perennial crops, the manufacture of plastics and rubber machinery, as well as various financial service activities (except insurance and pension funding n.e.c.) best handled the
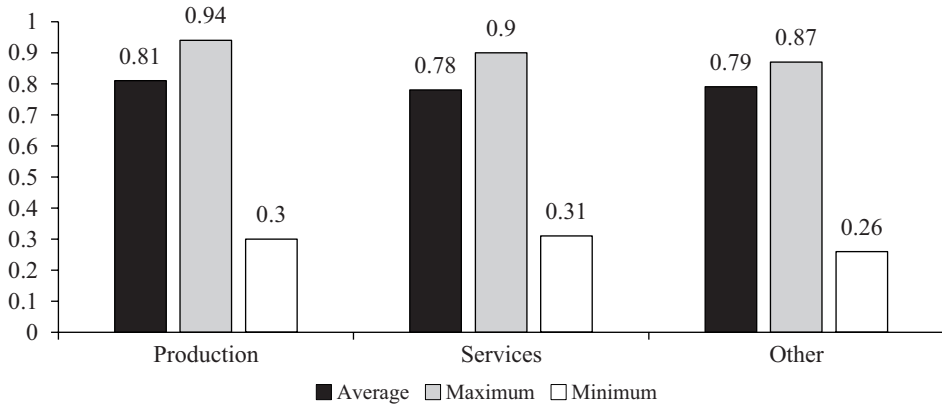
Chart 4.2. Statistics on industry types during the economic crisis

unfavourable economic conditions. Chart 4.2 presents a short summary of the impact the crisis had on industries, broken down by their types.

As indicated in Chart 4.2, production industries were the most affected by the economic slowdown. The average ratio for these industries was 0.81, while service industries reported an average of 0.78, and other industries 0.79. These scores do not differ significantly which suggests that the crisis affected all types of activity in Poland. The influence of particular variables on the final ranking is presented in Table 4.6.

Table 4.6. Impact of various factors on the ranking structure during the crisis

Factor	Production industries	Service industries	Other industries
Number of employees	negative	positive	neutral
Revenues from total activities	positive	positive	positive
Net value of fixed assets	positive	negative	negative
Capital expenditures	very negative	very negative	very negative
Net financial performance	very negative	very negative	positive

Scale from very positive to very negative was assigned to groups on the basis of the equal span formula.

Depending on the industry type, the impact of individual factors on the industry performance was different (e.g. number of employees, net financial results). There was a considerable deterioration in the net financial results generated, and this concerned about 70% of production and service industries, causing respectively a drop from 15% to over 30% in relation to 2007. Other industries recorded a slight increase in this area which amounted to approximately 3%. Capital expenditures deteriorated with a drop–on average–of 18% among all industries.

The number of employees decreased by approximately 6% in production industries, increased by approximately 4% in service industries, and among other industries remained at a steady level. Although for service and other industries there was a noticeable negative impact regarding the net value of fixed assets, the impact of this variable was rather low. In the analysed period, revenues in the entire economy grew–in production industries by approximately 5%, in service industries by approximately 11%, and in other industries by as much as 17%.

Table 4.7 presents a ranking indicating which individual industries still struggled with the effects of the crisis in 2011. Comparing the ranking–during and after the crisis–enables a determination as to whether the industries that were severely hit by the slowdown were able to rebuild their pre-crisis position.

Table 4.7. Ranking of activities during the time of prosperity–selected industries

No.	PKD	Impact	No.	PKD	Impact
1	24.10	0.97	329	43.91	0.80
2	46.90	0.95	330	42.12	0.80
3	73.12	0.94	331	31.03	0.78
4	28.11	0.94	332	68.10	0.77
5	81.10	0.94	333	78.20	0.77
6	43.12	0.94	334	64.99	0.75
7	20.16	0.93	335	82.99	0.73
8	74.90	0.93	336	46.52	0.71
9	47.21	0.93	337	46.11	0.59
10	23.32	0.93	338	35.14	0.43

Full industry listing can be found in Appendix 7.
Source: Based on the PontInfo Gospodarka database (accessed 22.06.2016).

Analysing the scope of changes among Polish industries after the global crisis, a distinct variation can be noticed in their ability to recreate the pre-crisis performance. The manufacture of basic iron, steel and ferro-alloys; the non-specialised wholesale trade; as well as activities related to media representation were still struggling. Additionally, the situation deteriorated significantly for the manufacture of engines and turbines, except aircraft, vehicle and cycle engines (154th position during the crisis, 4th afterwards); and combined facilities support activities (192th position during the crisis, 5th afterwards). The greatest improvement was recorded in the other industry section of granting credit (23rd position during the crisis, 312th afterwards).

As Chart 4.3 shows, the average values for production, service and other industries after the global crisis were similar. This means that when it comes to the type of industry, there was no clear leader who was able to find a prescription
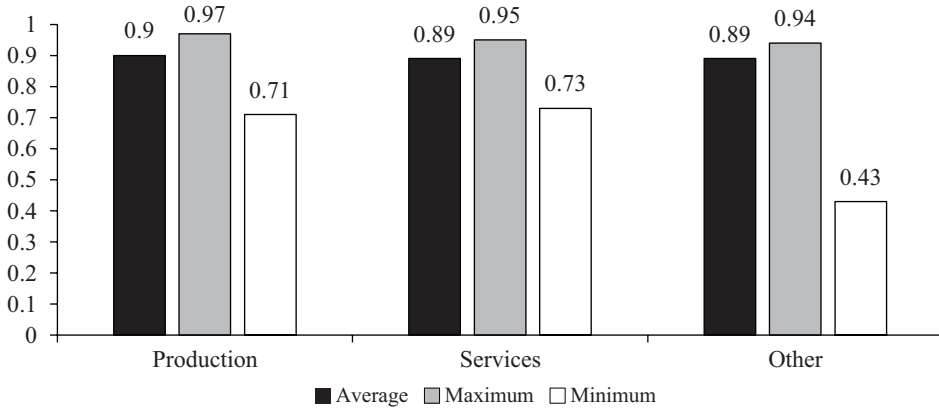
Chart 4.3. Statistics on industry types during the time of prosperity

to combat the effects of the crisis. Throughout the period, two of the analysed features deteriorated for production industries, and two for service industries (Table 4.8). In relation to 2007, in production industries, employment decreased by approximately 6%, but at the same time it increased by approximately 12% in services and approximately 4% in other industries. In production, increased employment concerned only about 40% of industries (63 industries), and a decrease in as many as 60% (98 industries). The employment trend among service industries was the reverse, and an employment growth was also noted for about 57% of other industries. Revenues grew in all sections, with growth of 29% for services, 26% for production, and more than 55% in other industries. The net value of fixed assets was positive for all industries; however, as in the case of previous indicators, the most significant improvement concerned other industries (an increase of approximately 90% compared to 2007). Financial results turned out to be negative for service (59 industries) and production (83 industries). A similar relationship occurred in the case of capital expenditures, where the decrease amounted to 13% and 18% respectively.

Table 4.8. Factor impact on the ranking structure during the prosperity time

Factor	Production industries	Service industries	Other industries
Number of employees	negative	positive	positive
Revenues from total activities	positive	positive	very positive
Net value of fixed assets	positive	positive	positive
Capital expenditures	negative	negative	neutral
Net financial performance	negative	negative	positive

Scale from very positive to very negative was assigned to groups on the basis of the equal span formula.

Similarly to the ranking of countries, an attempt to cross-reference the situation of industries during and after the economic crisis was made (Chart 4.4). However, it should be remembered that the analysed situation concerns Poland, a country in which the effects of the crisis–in comparison with other economies– were not the most visible. As can be easily observed, most industries struggled both during the crisis and shortly afterwards. It should be remembered that these are relative values and crafting a similar ranking for Europe might prove such conclusions to be premature. Hence, for the sake of a more appropriate analysis, it is worth focusing on the scores that stand out.

Five industries clearly stood out from the others. Agents involved in the sale of agricultural raw materials, live animals, textile raw materials, and semi-finished goods (46.11) performed relatively well during and after the crisis. Trade in electricity (35.14) achieved worse results in 2009, but managed to rebuild its standing quickly. What is more surprising and also interesting is the situation of three industries which, although initially not feeling the symptoms of economic slowdown, in subsequent years showed declines.

Other financial service activities–except insurance and pension funding n.e.c.–(64.99) showed significant decreases in the value of investments and the value of fixed assets. At the same time, the industry showed an increase both in the number of its members (about 5-fold) and the number of employees (about 7-fold). However, company ownership costs increased, in particular operating and financial costs, which undermined the financial situation of companies in the industry.

The manufacture of plastic and rubber machinery (28.96) was badly affected since all five factors deteriorated, in particular investments and the value of fixed assets. Although the industry grew in terms of the level of employment, revenues declined and net financial result worsened. However, the analysis can be misleading. Companies reported their peak results (revenues, profit, degree of internationalisation) exactly in the crisis period, i.e. 2009. This means unreliable or rather unexpected reference data.

The last of the industries considered–growing various non-perennial crops (01.19)–also reported troubles in all the aspects analysed. The largest decreases were recorded in financial performance (a 10-fold decrease) and the value of fixed assets (a 5-fold decrease). The industry is still in the stage of maturity, but the first symptoms of transition to the decline stage are already there–profitability decreases along with the number of industry members. The costs of maintaining core operations as well as operating and financial costs are also increasing. The number of companies with foreign capital decreased–in 2014 only one foreign investor achieved a positive financial result, while the other three that did not perform were planning to leave the industry. That eventually happened in 2015.
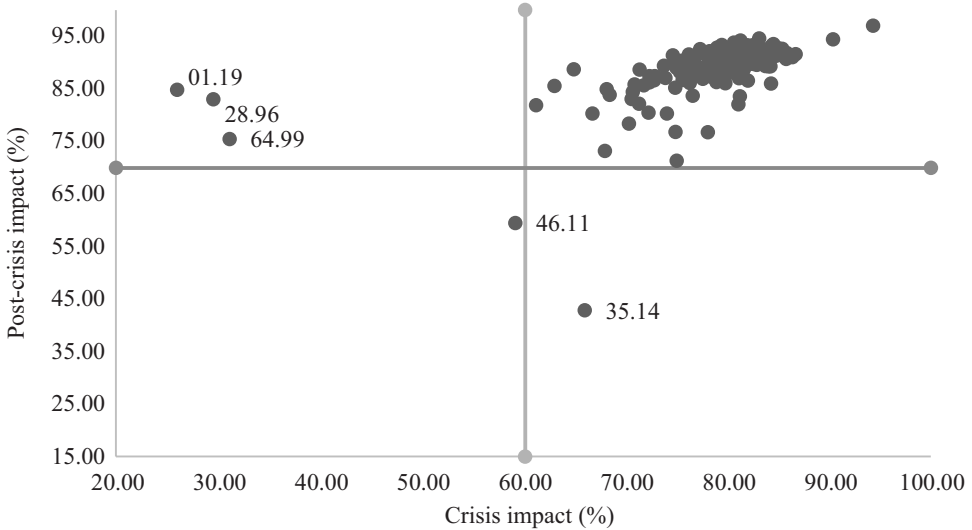
Chart 4.4. Situation of industries during and after the global economic crisis (degree of impact in %)

Items assigned to groups on the basis of the equal span formula.

Summary

Although it is objectively assumed that Poland did not experience the effects of the economic crisis as much as other European countries did, a statement that the economy did not suffer at all would be a far-reaching distortion. In various spheres of economic life there were visible symptoms of the crisis, which also influenced the strategies applied by companies both in domestic and foreign markets. This situation also influenced the way various industries performed at the time. One of the stylised facts about business cycles is that there is an assumption a crisis affects all industries in the economy. In the light of the analysis conducted this statement can be considered true, although the extent to which turbulence has affected particular industries of the economy is different. Production industries suffered the most in Poland; however, the difference in relation to non-productive industries is relatively small. One also has to bear in mind that the industries' performance was also stable in reference to industries in other countries.

The fact that individual industries actually revealed signs of economic slow-down and that a return to pre-crisis performance levels did not in all cases proceed smoothly justifies proposing the following hypothesis: that the economic

situation in a country can determine the willingness of industries to participate in foreign ventures. Thus, Chapter Five partially concentrates on the potential effects the crisis might have caused to degree of industry internationalisation. This, in turn, can answer the question whether companies treat internationalisation process as an integral, strategic way of handling their business or as an *ad hoc* tool for gaining additional revenues.

5. The degree and determinants of industry internationalisation–the case of Poland

The nature of the internationalisation process and thus the achieved internationalisation degree are a complex phenomenon. It can be and potentially is determined and influenced by various external and internal conditions. Although these conditions may vary among economies, in here the focus is set on Poland to verify how the internationalisation degree of industries formed. The empirical research scheme concentrates on two separate aims. The first one relates to an assessment of the degree of internationalisation of Polish industries in the periods before, during and after the economic crisis. The second one focuses on verifying what determines the degree of industry internationalisation.

5.1. Degree of industry internationalisation measure–establishing the weights

Establishing the weights for the variables in multivariate measures for the degree of industry internationalisation may be based not only on statistical methods, but also on expert opinions. Therefore, when deciding on the final formula for the degree of industry outward and inward internationalisation, the Delphi method was applied (Linstone & Turoff, 1975). This method seems to be appropriate since the weights are of great importance for the final shape of the indicator, and including managerial knowledge and experience enables its relative objectivisation (Dyer, 1979, p. 45).

In contrast to many statistical methods, the selection of a research sample using the Delphi method is deliberate. This means that the researcher selects the respondents based on their knowledge and experience so as to obtain the most comprehensive results (Goldschmidt, 1996, p. 126). In the following survey, the group of respondents included managers responsible for foreign expansion (managers/sales directors), and executives responsible for company strategy. In a few cases, the respondents were employees whose positions were not directly related to the company's international operations, but whose knowledge on the

subject allowed them to be included in the group of potential experts. Companies from both production and non-production industries are included (Appendix 2).

The group of respondents consists of 25 representatives from various industries. The group was selected based on the industries' distribution according to PKD 2007. Section C is the one most numerously represented since it covers the largest number of industries (242). Similarly, section G is also well-represented as it includes 92 industries. Because some experts declined to participate in the survey it was not possible to obtain representatives from all the sections examined, but the cross-section of the experts' experience seems to be wide and diverse enough to conduct the study.

The research was carried out between 01/03/2015 and 15/06/2015. Two rounds[56] of paper-based questionnaire surveys were carried out during that time. The questionnaire is presented in Appendix 1. Although its outline is quite short, some experts failed to keep to the deadline for returning their responses, which in turn lengthened the duration of the first round. In the following round, necessary changes to the questionnaire suggested by the respondents were introduced. These amendments were aimed at facilitating a coherent understanding of all the terms used in the questionnaire. The most essential change was the stipulation that the indicator's final formula will not cover the width of internationalisation, i.e. the industry's geographical scope. When constructing the questionnaire for Round I, this particular dimension was considered, but only to understand how important this aspect of internationalisation was in the experts' opinion. Some of the managers, however, made the following significant comments:

– this factor has never been assessed as a crucial one–the majority of respondents indicated it in 3rd or 4th place in terms of significance,

– there were significant differences in opinion about an adequate tool for measuring geographical coverage, with the suggested average number of foreign countries being considered a measure having no information value.

The first round of research did not yield conclusive results. The experts surveyed were quite significantly divided in their opinions. As far as outward internationalisation is concerned, the internationalisation scale and the number of companies undertaking foreign activities were undoubtedly named as the most important factors. Besides, there was entry mode, and while there was a clear pattern regarding the priority of the individual components in the measure, there was much more debate regarding the weights of these components in the formula.

As far as inward internationalisation is concerned, the experts' opinions were much more unified, probably since the number of components in question was

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[56] Experts suggest that two to four study rounds give the best possible results. Increasing the number of rounds usually results in a lack of relevance for the new information collected (Turoff, 2002, p. 84).

smaller.[57] The sales volume of foreign-owned companies in the domestic market was mentioned as the key variable, while lower meanings were assigned to the number of importers and companies with foreign capital. However, again, Round I did not bring consensus in establishing the weight of the components.

In Round II of the survey, the experts were supplemented with a short report on the results obtained in Round I. This included information on the aggregated data from all the respondents. They were once again asked to review their initial standing having considered this new information. After Round II, the experts' opinions could be considered convergent enough that proceeding with another survey round did not seem justified. This applied to both the degree of inward and outward internationalisation measurements.

Based on the Delphi method, the weights of the variables for the multivariate indicators were set as specified in Table 5.1.

Table 5.1. Weights of the variables for the degree of industry internationalisation measurements–based on the Delphi method

Industry outward internationalisation degree			
Component	industry structure	geographical scope	internationalisation intensity	entry mode
Weight	**0.30**	**0.00 – excluded**	**0.50**	**0.20**
Industry inward internationalisation degree			
Component	foreign-owned companies' revenues in domestic market	importers	industry's ownership structure
Weight	**0.40**	**0.30**	**0.30**

Source: Based on Delphi method survey.

To assess the quality of the constructed measure statistical tests were carried out, including the following:
– correlation analysis,
– Cronbach's alpha reliability test,
– factor analysis,
– distribution analysis.

In the case of the multivariate measure concerning the degree of industry outward internationalisation, correlation analysis results indicated that each item exceeded a value of 0.55. Therefore, taking into consideration commonly accepted standards (Nunnally, 1978) one can conclude that all the items can be included in the creation of the final measure of degree. Cronbach's alpha reliability test reported a score of around 0.75[58] (Table 5.2). The threshold value for accept-

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[57] Compared to the number of components in Round I.
[58] The exact scores for individual years are presented in Table 5.2.

ing the measure as reliable is 0.7, however some studies claim that even scores above a value of 0.6 can be ruled as adequate (cf. Szymura-Tyc, 2013). Factor analysis indicated that all three factors are worth retention and the final measure should be composed of the three items.

Table 5.2. The degree of industry outward internationalisation–the measure's reliability

Year	Value	Industry structure	Internationali-sation intensity	Entry mode	Cronbach's alpha
2007	Correlation[a]	0.70	0.66	0.59	0.74
	Alpha[b]	0.52	0.69	0.73	
2008	Correlation[a]	0.70	0.68	0.60	0.74
	Alpha[b]	0.54	0.68	0.69	
2009	Correlation[a]	0.72	0.66	0.60	0.75
	Alpha[b]	0.52	0.70	0.69	
2010	Correlation[a]	0.72	0.65	0.59	0.75
	Alpha[b]	0.52	0.70	0.70	
2011	Correlation[a]	0.72	0.65	0.58	0.74
	Alpha[b]	0.53	0.68	0.72	
2012	Correlation[a]	0.73	0.66	0.58	0.75
	Alpha[b]	0.53	0.69	0.72	
2013	Correlation[a]	0.73	0.67	0.56	0.75
	Alpha[b]	0.53	0.67	0.74	
2014	Correlation[a]	0.73	0.67	0.57	0.76
	Alpha[b]	0.55	0.68	0.73	
2015	Correlation[a]	0.54	0.69	0.57	0.75
	Alpha[b]	0.72	0.68	0.73	

[a] Item correlation with the measure.
[b] Cronbach's alpha if item deleted.
Source: Based on the PontInfo Gospodarka database (accessed 20.05.2018).

Similar tests were carried out for the degree of industry inward internation-alisation. Once again, the correlation analysis did not give cause for concern, since the items reported a score exceeding a value of 0.55. Here, however, the strength of the correlation between item-totals and individual components varies much more than it was visible in the case of outward internationalisation (Table 5.3). Cronbach's alpha reliability score decreased in comparison to the outward measure since it was around 0.72 (Table 5.3). It is, however, still an acceptable value. Again, based on factor analysis, a final indicator composed of three items should be created. The distribution analysis showed that the measure follows a normal distribution.

Table 5.3. The degree of industry inward internationalisation–the measure's reliability

Year	Value	Industry's ownership structure	Importers	Foreign-owned companies' revenues in domestic market	Cronbach's alpha
2007	Correlation[a]	0.61	0.63	0.67	**0.71**
	Alpha[b]	0.70	0.67	0.61	
2008	Correlation[a]	0.61	0.62	0.69	**0.71**
	Alpha[b]	0.72*	0.69	0.61	
2009	Correlation[a]	0.65	0.66	0.60	**0.74**
	Alpha[b]	0.63	0.67	0.72	
2010	Correlation[a]	0.62	0.65	0.59	**0.72**
	Alpha[b]	0.69	0.68	0.70	
2011	Correlation[a]	0.62	0.60	0.59	**0.72**
	Alpha[b]	0.68	0.70	0.71	
2012	Correlation[a]	0.64	0.66	0.59	**0.73**
	Alpha[b]	0.68	0.67	0.72	
2013	Correlation[a]	0.62	0.61	0.58	**0.70**
	Alpha[b]	0.67	0.69	0.73*	
2014	Correlation[a]	0.60	0.65	0.60	**0.74**
	Alpha[b]	0.71	0.68	0.71	
2015	Correlation[a]	0.59	0.64	0.61	**0.73**
	Alpha[b]	0.69	0.67	0.70	

[a] Item correlation with the measure.
[b] Cronbach's alpha if item deleted.
* New Cronbach's alpha higher if the item is deleted.
Source: Based on the PontInfo Gospodarka database (accessed 20.05.2018).

5.2. Degree of industry internationalisation and its characteristics–chosen aspects

In the period between 2007 and 2015 the degree of internationalisation of Polish industries differed greatly; however, most of the industries could be labelled as local ones. This means that their overall internationalisation score, including different dimensions of this process, was relatively low. As the histograms in Chart 5.1 indicate, this situation lasted over the whole period analysed. The total number of industries that did not engage in international operations
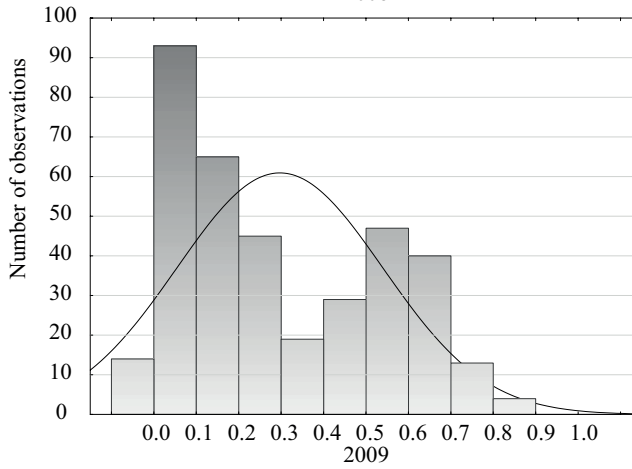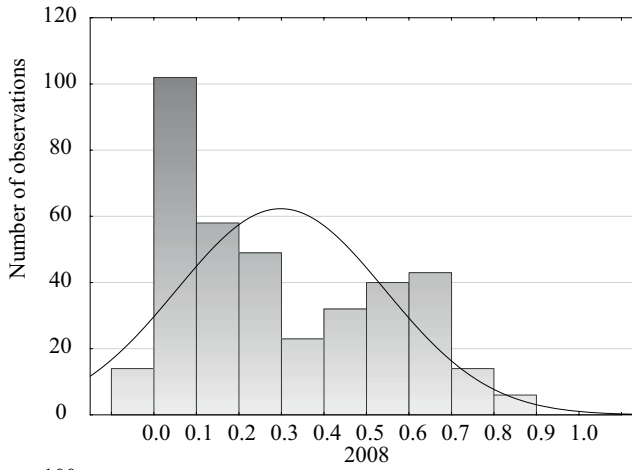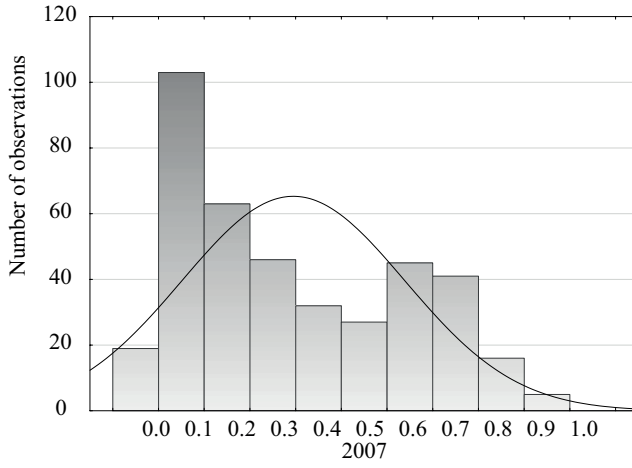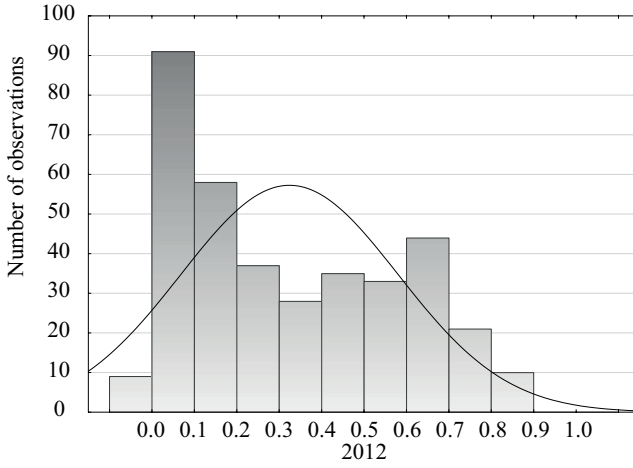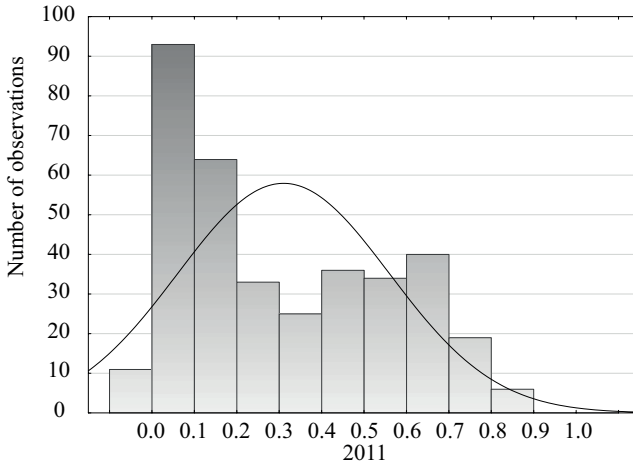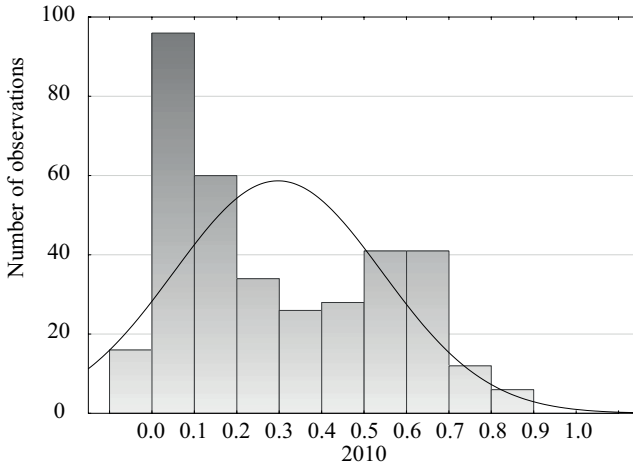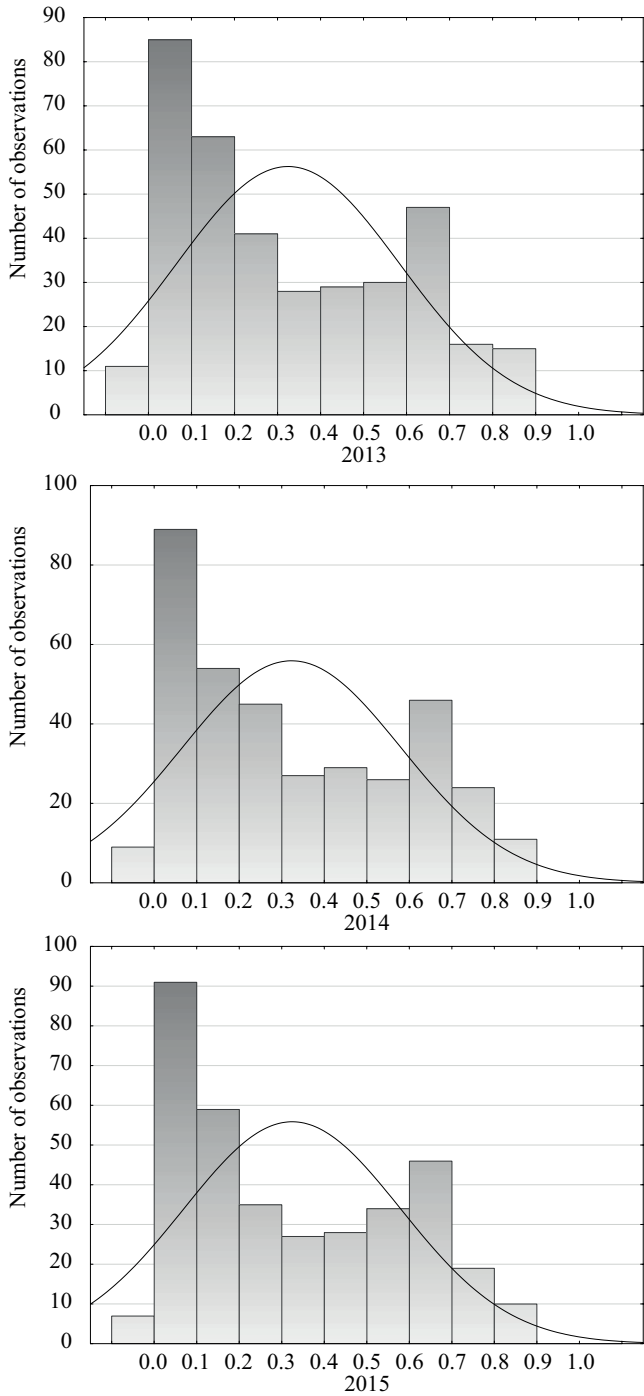
Chart 5.1. Degree of industry internationalisation 2007-2015: histograms

Table 5.4. Degree of industry internationalisation and industry technological advancement (2007-2015)

Type		Financial KIS	High-tech	High-tech KIS	Low tech	Market KIS	Market LKIS	Medium-high tech	Medium-low tech	Other	Other KIS	Other LKIS
2007	M	0.02	0.48	0.14	0.5	0.16	0.13	0.60	0.43	0.10	0.03	0.08
	SD	0.01	0.21	0.11	0.14	0.09	0.09	0.12	0.20	0.10	0.04	0.00
2008	M	0.02	0.46	0.14	0.49	0.18	0.13	0.60	0.44	0.10	0.04	0.07
	SD	0.03	0.23	0.10	0.13	0.08	0.08	0.12	0.21	0.11	0.05	0.00
2009	M	0.05	0.53	0.15	0.51	0.17	0.13	0.60	0.43	0.10	0.05	0.07
	SD	0.05	0.25	0.09	0.13	0.07	0.08	0.12	0.21	0.13	0.06	0.03
2010	M	0.06	0.47	0.15	0.51	0.17	0.13	0.61	0.43	0.10	0.05	0.06
	SD	0.04	0.24	0.13	0.13	0.08	0.09	0.12	0.21	0.11	0.05	0.05
2011	M	0.13	0.51	0.20	0.51	0.15	0.14	0.62	0.44	0.10	0.05	0.06
	SD	0.20	0.25	0.19	0.15	0.06	0.11	0.13	0.21	0.11	0.07	0.03
2012	M	0.12	0.55	0.22	0.52	0.17	0.14	0.64	0.45	0.09	0.05	0.06
	SD	0.16	0.22	0.20	0.14	0.08	0.11	0.12	0.21	0.10	0.06	0.04
2013	M	0.13	0.53	0.22	0.53	0.18	0.14	0.64	0.47	0.10	0.05	0.05
	SD	0.17	0.26	0.18	0.14	0.07	0.11	0.12	0.22	0.09	0.07	0.06
2014	M	0.13	0.56	0.26	0.53	0.18	0.15	0.65	0.46	0.09	0.05	0.07
	SD	0.18	0.25	0.21	0.15	0.07	0.11	0.12	0.22	0.10	0.06	0.06
2015	M	0.12	0.55	0.25	0.53	0.18	0.15	0.64	0.47	0.09	0.05	0.07
	SD	0.15	0.25	0.19	0.14	0.06	0.11	0.11	0.21	0.09	0.06	0.05

M – medium, SD – standard deviation.

dropped from 19 in 2007 to just 7 in 2015, but internationalisation did not follow a normal distribution. Most industries reported scores between 0 and 0.3, indicating a low degree of internationalisation. Industries with a moderate degree of internationalisation (between 0.3 and 0.5) were scarce, whilst the number of highly internationalised industries (scores between 0.5 and 0.7) increased again.

Cross-referencing the data on the degree of industry internationalisation with their technological advancement one can easily notice some trends in the division between production and non-production industries. Production industries are generally more internationalised; however, these are medium-high production industries that exhibit the highest degree of internationalisation. In the case of non-production industries, the knowledge-intensive-services market is the most prone to international ventures. Although technological advancement seems to promote internationalisation, one has to remember that overall high-tech products account for a relatively small share of exports (ca. 8.3% in 2011) (Mińska-Struzik, 2014). In conclusion, the technologically advanced industries report high internationalisation scores since the measure includes not only export revenues, but also other dimensions of this process (Table 5.4).

Valuable information can also be obtained if the degree of industry internationalisation is cross-referenced with the industry life cycle (Table 5.5). In the whole period analysed the lowest degree of internationalisation is observed among the industries that are in the growth stage. The degree of internationalisation rises significantly in the maturity stage and then decreases again in the decline stage. This may mean that in the reality of the Polish economy, companies mostly follow a gradual internationalisation model rather than an early internationalisation one. It could also be caused by the sample distribution – most of the industries in question are either in the maturity phase (72%) or the decline stage (12%).

Table 5.5. Degree of industry internationalisation and industry life cycle stage (2007-2015)

Industry life cycle stage		Growth	Maturity	Decline
2007	M	0.12	0.33	0.29
	SD	0.00	0.24	0.23
2008	M	0.11	0.32	0.28
	SD	0.01	0.24	0.21
2009	M	0.13	0.33	0.30
	SD	0.06	0.24	0.24
2010	M	0.23	0.33	0.28
	SD	0.01	0.24	0.21

Industry life cycle stage		Growth	Maturity	Decline
2011	M	0.18	0.34	0.29
	SD	0.01	0.25	0.23
2012	M	0.24	0.34	0.30
	SD	0.08	0.25	0.23
2013	M	0.24	0.35	0.30
	SD	0.09	0.26	0.23
2014	M	0.28	0.35	0.30
	SD	0.09	0.25	0.24
2015	M	0.27	0.35	0.30
	SD	0.12	0.25	0.23

M – medium, SD – standard deviation.

Analysing the dependencies between the degree of industry internationalisation and the level of industry rivalry (also broken down to the periods before, during and after the global economic crisis) one can observe some general patterns (Table 5.6). Industries with a high level of rivalry indicate a much higher degree of internationalisation than industries with a moderate level of rivalry; and similarly, they report higher scores than industries with a low level of rivalry. The gaps between these three levels are however different–ca. 0.15 between high and moderate levels, and ca. 0.05 between moderate and low levels of rivalry. At the same time no major changes are apparent when one considers the effects the global economic slowdown had on the process.

Cross-referencing the degree of industry internationalisation and the type of economic activity, one can see that production industries exhibit a much higher average level of internationalisation than non-production industries (services and other industries, Table 5.7) in all years of the analysis. In the case of production industries the average score rises slightly but steadily, whereas in the case of services it does not rise until 2011. Those classified as other industries show a reverse trend–the highest average score in the crisis period, and then in the following years it decreases.

The highest degree of internationalisation scores among production industries are between 0.8 and 0.9. Industries that belong to this group are relatively scarce as they account for only ca. 10 in each of the analysed years. As Table 5.8 indicates, these industries represent section C (manufacture of motor vehicles, trailers and semi-trailers; manufacture of rubber and plastic products; manufacture of chemicals and chemical products, etc.). Depending on the year their industry standings change; however, those changes are not detrimental and their degree

Table 5.6. Degree of industry internationalisation and level of industry rivalry (broken down to before, during and after the economic crisis)

Type		Before economic crisis			During economic crisis			After economic crisis		
		High	Moderate	Low	High	Moderate	Low	High	Moderate	Low
2007	M	0.46	0.30	0.27	0.43	0.33	0.26	0.43	0.35	0.25
	SD	0.23	0.25	0.20	0.24	0.25	0.21	0.23	0.25	0.21
2008	M	0.46	0.30	0.26	0.43	0.32	0.26	0.42	0.35	0.25
	SD	0.23	0.24	0.20	0.24	0.24	0.21	0.22	0.25	0.20
2009	M	0.47	0.31	0.26	0.44	0.33	0.26	0.44	0.36	0.25
	SD	0.24	0.24	0.20	0.25	0.24	0.21	0.24	0.25	0.20
2010	M	0.47	0.30	0.26	0.44	0.33	0.25	0.44	0.35	0.24
	SD	0.23	0.24	0.21	0.24	0.24	0.21	0.24	0.25	0.21
2011	M	0.49	0.31	0.27	0.46	0.34	0.26	0.46	0.36	0.25
	SD	0.24	0.25	0.21	0.25	0.25	0.22	0.24	0.26	0.21
2012	M	0.49	0.32	0.27	0.46	0.35	0.27	0.47	0.37	0.25
	SD	0.24	0.25	0.22	0.25	0.25	0.22	0.24	0.26	0.21
2013	M	0.50	0.33	0.28	0.47	0.35	0.27	0.47	0.38	0.26
	SD	0.25	0.25	0.22	0.26	0.25	0.23	0.25	0.26	0.22
2014	M	0.50	0.33	0.28	0.47	0.36	0.28	0.47	0.38	0.26
	SD	0.24	0.25	0.22	0.25	0.25	0.23	0.24	0.26	0.22
2015	M	0.50	0.33	0.28	0.47	0.35	0.27	0.47	0.38	0.26
	SD	0.23	0.25	0.22	0.24	0.25	0.22	0.23	0.26	0.22

M – medium, SD – standard deviation.
Groups: High, Moderate and Low were calculated on the basis of the equal span formula.

Table 5.7. Industry internationalisation degree and industry type (2007-2015)

Type	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Average								
Produc-tion	0.51	0.51	0.50	0.51	0.52	0.54	0.54	0.54	0.55
Services	0.11	0.11	0.11	0.11	0.12	0.13	0.13	0.14	0.14
Other	0.17	0.18	0.20	0.17	0.15	0.14	0.14	0.13	0.09
	Maximum								
Produc-tion	0.86	0.85	0.87	0.83	0.87	0.88	0.89	0.90	1.00
Services	0.65	0.68	0.60	0.57	0.63	0.62	0.58	0.69	0.70
Other	0.57	0.62	0.64	0.59	0.58	0.59	0.67	0.44	0.25

Table 5.8. Industries with the highest degree of internationalisation (2007-2015)

Posi-tion	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	29.10	29.31	30.30	24.53	29.31	29.31	29.31	29.31	17.24
2	13.96	29.10	29.10	29.10	30.12	30.91	28.94	17.24	29.31
3	20.60	13.96	30.12	28.15	13.93	29.10	17.24	28.94	30.12
4	28.15	30.12	27.51	30.12	29.10	20.60	30.30	30.30	27.20
5	27.31	27.40	22.19	30.30	30.30	30.30	29.10	27.40	27.40
6	29.31	28.15	24.53	13.96	28.15	24.41	30.12	29.32	29.32
7	30.11	30.30	22.11	20.60	30.91	14.11	27.40	30.12	30.30
8	27.40	22.19	30.92	27.51	28.11	27.20	13.93	29.10	28.94
9	22.11	27.31	13.96	22.11	27.51	24.53	27.20	22.19	29.10
10	22.19	27.51	28.15	22.19	13.96	27.40	14.11	13.93	13.93

of industry internationalisation remains high. In the case of services, the highest score refers to sea and costal transport.

Analysing the data on the degree of industry internationalisation it is also worth considering the changes that happened in the period in question. The highest increase in internationalisation score is mainly noticed among service industries (Table 5.9). The highest jump is by the *Research and experimental development on social sciences and humanities* industry, which amounts to an increase of 0.47. The crucial factor responsible for this change is revenues generated in foreign markets. All of the industries listed in Table 5.9 (except for *Research and experimental development on social sciences and humanities*) underwent a gradual increase. However, industry 72.2 fluctuated a lot and it is still unclear whether the increase is permanent or if it will continue to change.

Table 5.9. Industries with the highest increase in degree of internationalisation between 2007 and 2015

Industry	Increase
72.2 Research and experimental development on social sciences and humanities	0.47
63.11 Data processing, hosting and related activities	0.39
63.91 News agency activities	0.37
52.22 Service activities incidental to water transportation	0.30
52.1 Warehousing and storage	0.29
28.12 Manufacture of fluid power equipment	0.27
64.99 Other financial service activities, except insurance and pension funding n.e.c.	0.26
74.3 Translation and interpretation activities	0.26
24.44 Copper production	0.26
72.11 Research and experimental development on biotechnology	0.25

The situation among industries with the highest decrease in the degree of internationalisation varies much more since it concerns both production and non-production (service and other) industries. In this case one cannot talk about a gradual limitation of industry's international operations. Production and agricultural industries, for instance, fluctuated a lot, increasing their international involvement during the crisis period and then ending it once the economy accelerated again.

Table 5.10. Industries with the highest decrease in degree of internationalisation between 2007 and 2015

Industry	Decrease
01.24 Growing of pome fruits and stone fruits	–0.39
09.9 Support activities for other mining and quarrying	–0.28
46.23 Wholesale of live animals	–0.23
27.31 Manufacture of fibre optic cables	–0.20
01.19 Growing of other non-perennial crops	–0.20
10.85 Manufacture of prepared meals and dishes	–0.15
09.1 Support activities for petroleum and natural gas extraction	–0.15
16.29 Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	–0.15
90.01 Performing arts	–0.14
28.11 Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	–0.14

5.3. An attempt at industry segmentation–cluster analysis through the lens of internationalisation

Although the variance analysis for the period 2007-2015 did not return statistically important differences, an attempt to classify the industries into homogenous groups based on their international characteristics is made.[59] The aims of such groupings are twofold: (1) to verify whether Polish industries do indeed display common expansion features, and (2) to verify how economic conditions influence their international orientation.

The cluster analysis is based on Ward's method (when deciding on the cluster number) and the k-mean clustering method. The clustering is repeated for five separate time points: 2007 as the year preceding the economic crisis; 2009 as the crisis year; 2011 as the prosperity year; plus 2013 and 2015 as years of relative stability after the crisis. Based on five dendograms presenting the potential number of clusters and the fusion curves, four groups are eventually identified for further studies. The composites from the multivariate degree of industry internationalisation measure are used as grouping variables, i.e. industry internationalisation structure, internationalisation intensity (revenues) and the dominant entry mode.

The grouping was made based on the k-mean clustering method for the four *a priori* identified clusters. Solution was obtained after 2 iterations. The groups differ significantly in terms of the grouping features analysed. However, before presenting the results of the clustering itself, it is worth first having a closer look at the impact each grouping variable has on the outcomes. To this end the F-test was applied, and based on the values obtained, with a significance level of $p = 0.05$ as the reference level, one can conclude that the variables used differentiate the clusters quite well (Table 5.11).

The total number of industries included in the study is 338.[60] As indicated in Table 5.11 the F-value for all the components is very high over the whole period analysed. This means that the results fulfilled the goal of minimising the within-cluster variance and maximising the between-cluster variance. In the case of the entry mode variable the within-cluster variance is 0, which does not allow for calculating the F-value.[61] Based on the other F-values one can

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[59] More information on variance analysis is presented in subchapter 5.5.

[60] The number of industries complies with Stage I of the study. Due to the assumed comparison of changes between 2007 and 2015, it is necessary to select only those industries that have full information throughout the analysed period. Hence, it is not possible to apply the analysis to the sample size from Stage IIb.

[61] The formula (between-cluster) distance / (within-cluster) distance was used to calculate the F-test value.

Table 5.11. Variance analysis

Year	Variables	Between clusters	df	Within clusters	df	F-value	Significance p
2007	Industry internationalisation structure	23.51	3	4.97	334	515.34	0.00
	Industry internationalisation intensification	6.15	3	5.67	334	118.23	0.00
	Dominant entry mode	70.18	3	0.00	334		
2009	Industry internationalisation structure	23.01	3	5.13	334	488.94	0.00
	Industry internationalisation intensification	7.25	3	4.98	334	158.90	0.00
	Dominant entry mode	70.18	3	0.00	334		
2011	Industry internationalisation structure	20.19	3	6.86	334	320.98	0.00
	Industry internationalisation intensification	8.60	3	5.80	334	161.67	0.00
	Dominant entry mode	73.78	3	0.00	334		
2013	Industry internationalisation structure	21.74	3	7.15	334	331.23	0.00
	Industry internationalisation intensification	9.88	3	6.10	334	176.67	0.00
	Dominant entry mode	73.78	3	0.00	334		
2015	Industry internationalisation structure	21.18	3	6.04	334	381.96	0.00
	Industry internationalisation intensification	9.67	3	6.05	334	174.17	0.00
	Dominant entry mode	73.78	3	0.00	334		

Source: Based on the PontInfo Gospodarka database (accessed 20.05.2018).

conclude that the variable that differentiates the clusters most is the industry internationalisation structure. The results for the variable mean values are presented in Table 5.12.

Cluster 1[62] is characterised by low international expansion since both the number of companies undertaking international operations and the revenues generated abroad are insignificant. Moreover, mostly non-equity (export) modes are used. Thus, this group of industries will further be called *domestic industries*. Cluster 2 is the least homogenous of all the groups distinguished. The number

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[62] The following cluster characteristics will refer to the years 2007, 2011, 2013, 2015. The impact of the crisis on the grouping structure will be discussed later on.

Table 5.12. Cluster mean values

Year	Variables	Cluster 1	Cluster2	Cluster 3	Cluster 4
2007	Industry internationalisation structure	0.19	0.64	0.81	0.66
	Industry internationalisation intensification	0.05	0.18	0.46	0.26
	Dominant entry mode	0.00	1.00	1.00	0.00
2009	Industry internationalisation structure	0.13	0.46	0.73	0.80
	Industry internationalisation intensification	0.03	0.14	0.34	0.45
	Dominant entry mode	0.00	0.00	1.00	0.00
2011	Industry internationalisation structure	0.21	0.46	0.79	0.66
	Industry internationalisation intensification	0.06	0.16	0.43	0.36
	Dominant entry mode	0.00	1.00	1.00	0.00
2013	Industry internationalisation structure	0.20	0.49	0.80	0.67
	Industry internationalisation intensification	0.06	0.17	0.48	0.36
	Dominant entry mode	0.00	1.00	1.00	0.00
2015	Industry internationalisation structure	0.24	0.48	0.78	0.73
	Industry internationalisation intensification	0.07	0.17	0.46	0.43
	Dominant entry mode	0.00	1.00	1.00	0.00

Source: Based on the PontInfo Gospodarka database (accessed 20.05.2018).

of entities operating abroad is relatively high, with companies expanding using equity modes; however, the revenues generated in foreign markets are low. Therefore, these industries will hereafter be called *internationalised equity-riders*. Cluster 3 is distinguished by the number of companies that internationalise and the sales revenues they generate abroad, as well as the use of equity entry modes. Hence, these industries are the closest to becoming *globalised*. The last one is similar to cluster two; however, Cluster 4 companies approach internationalisation entry modes differently. They turn to non-equity solutions and are thus called *internationalised exporters*.

The year 2009, known as the crisis year, disrupts the pattern observed in the clustering. Although *domestic* and *globalised* industries (Clusters 1 and 3) can still be quite clearly distinguished, the other two categories do not fit. In both cases the industries switch to non-equity entry modes and the only real difference can be seen in the borderline values of the industry internationalisation intensification variable (revenues generated abroad).

Additionally, the analysis is enriched with the results of the Euclidean distances between clusters (Table 5.13). As predicted cluster one and three, representing domestic and globalised industries, are the most distant ones. Considering these results it is worth posing questions on specific features of these clusters. Do they differ in size? What is their business domain? In what way are

they unique? How did they evolve over time? Some of these doubts can be dispelled with the information presented in Tables 5.14 and 5.15.

Table 5.13. Euclidean distances between clusters

Year	Cluster[a]	Cluster 1	Cluster2	Cluster 3	Cluster 4
2007	Cluster 1	0.00	0.41	0.52	0.09
	Cluster 2	0.64	0.00	0.04	0.34
	Cluster 3	0.72	0.19	0.00	0.35
	Cluster 4	0.30	0.58	0.60	0.00
2009	Cluster 1	0.00	0.04	0.49	0.21
	Cluster 2	0.20	0.00	0.07	0.37
	Cluster 3	0.70	0.27	0.00	0.34
	Cluster 4	0.46	0.61	0.58	0.00
2011	Cluster 1	0.00	0.36	0.49	0.10
	Cluster 2	0.60	0.00	0.06	0.36
	Cluster 3	0.70	0.24	0.00	0.34
	Cluster 4	0.31	0.60	0.58	0.00
2013	Cluster 1	0.00	0.36	0.51	0.10
	Cluster 2	0.60	0.00	0.06	0.36
	Cluster 3	0.72	0.25	0.00	0.34
	Cluster 4	0.32	0.60	0.59	0.00
2015	Cluster 1	0.00	0.12	0.48	0.36
	Cluster 2	0.35	0.00	0.33	0.38
	Cluster 3	0.69	0.58	0.00	0.06
	Cluster 4	0.60	0.61	0.24	0.00

[a] – distances below diagonal, squared distances above the diagonal.
Source: Based on the PontInfo Gospodarka database (accessed 20.05.2018).

As indicated below (Table 5.15) 94 industries changed the cluster they belonged to during the period 2007-2015[63] (Figure 5.1). The remaining 244 industries showed relative stability, i.e. during the whole period analysed neither their overall degree of industry internationalisation changed, nor did their internationalisation specifics. Among the abovementioned 94 industries, 41 increased their degree of internationalisation and complexity, 27 decreased, and 26 remained on the borderline of two clusters. Most of the changes were gradual in nature; meaning that either the increase or decrease had a sequential, evolutionary character.[64] Most interesting were the industries that, if to apply international busi-

[63] The period analysed excludes the year 2009 due to the reasons previously explained.

[64] Cluster analysis does not rank groups according to any pattern; it only allows a determination as to what extent individual clusters are distinct from one another. Nevertheless, the clusters

ness terminology, were *leapfrogging*, i.e. they moved to more complex clusters, bypassing some intermediate stage. This can be observed with 8 *domestic industries* which rapidly became *internationalised equity-riders*,[65] and one industry that was throughout *export-oriented* but became *globalised*.[66] Additionally, 16 industries are on the borderline between *domestic industries* and *internationalised exporters*. They cannot be ruled permanently as either since their degree of internationalisation changes only slightly and has no defined direction. Similarly, 10 industries are singled out as industries in-between the *internationalised equity-riders* cluster and the *globalised* cluster.

Table 5.14. Cluster characteristics

Cluster	Industry characteristics
Domestic industries	− non-production (service and other) industries dominance − considerable differentiation in industries' size − industries of low equity involvement in foreign markets − considerable differentiation in industries' profitability − low-tech industry dominance
Internationalised exporters	− lack of industry specialisation type − medium size industries dominance (from 50 to 400 registered entities[a]) − industries of low/medium equity involvement in foreign markets − high profitability industries dominance − low/medium-low tech industry dominance
Internationalised equity-riders	− production industries dominance − considerable differentiation in industries' size − industries of high equity involvement in foreign markets − moderate profitability industries dominance − high-tech industries dominance
Globalised industries	− production industries dominance − small size industries dominance (up to 150 registered entities[a]) − industries of high equity involvement in foreign markets − high profitability industries dominance − high-tech industries dominance

[a] – excludes all bankruptcy or insolvency proceedings.
Source: Based on the PontInfo Gospodarka database (accessed 20.05.2018).

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distinguished and their characteristics refer to the sequential model of company internationalisation. Hence, again to apply analogy, this concept is transferred to the meso-level which is visible in the "configuration" shown in Figure 5.1.

[65] The industries are these: 52.1 Warehousing and storage; 52.21 Service activities incidental to land transportation; 52.22 Service activities incidental to water transportation; 52.23 Service activities incidental to air transportation; 52.24 Cargo handling; 63.11 Data processing, hosting and related activities; 63.91 News agency activities; 64.99 Other financial service activities, except insurance and pension funding n.e.c.

[66] This industry is 63.91 News agency activities.

Table 5.15. Number of industries in each cluster

Cluster	2007	2011	2013	2015
Domestic industries	153	164	157	174
Internationalised exporters	80	59	66	49
Internationalised equity-riders	50	37	39	34
Globalised industries	55	78	76	81
Total	338	338	338	338

Source: Based on the PontInfo Gospodarka database (accessed 20.05.2018).
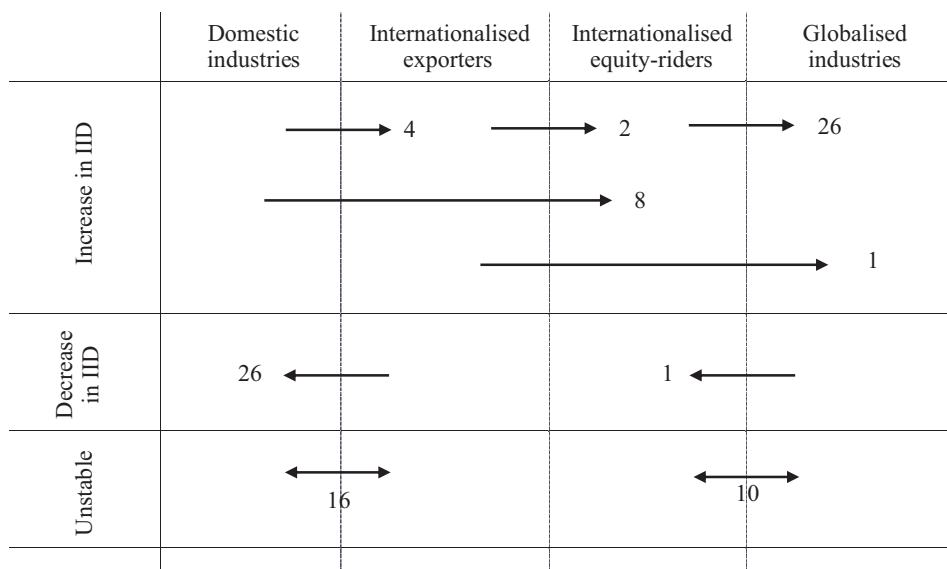
Figure 5.1. Changes in the cluster membership

IID – industry internationalisation degree

5.4. Industry internationalisation determinants in Poland

The literature overview aimed at selecting the correct empirical model proved fruitless since, to the best knowledge of the author, there have so far been no similar empirical studies on the degree of industry internationalisation. Therefore, based on the initial analysis of the dataset gathered and due to the character of the information at hand, panel models were decided upon. The dataset is balanced (cross-sectional) as the necessary information is available on all the items included in the sample. As potential variables determining the degree of industry

outward internationalisation, factors from Table 3.6 are considered, i.e. degree of industry inward internationalisation, level of industry transaction costs, industry life cycle stages, industry type, industry technological advancement and level of industry rivalry. Moreover, control variables are introduced which, although not included in the construction of hypotheses, may also, as the literature suggests, have an impact on the degree of industry internationalisation.[67] The control variables are the size of the industry, its impact on the country's GDP, and subsidies. Additionally, the analysis assumes that the dependant variable may have a delayed reaction to some of the determinants, which will be reflected in the model construct.

In order to choose the most appropriate estimator and, consequently, to determine if the estimated model has significant individual effects, the Wald test and the Breusch-Pagan test are used (i.e. diagnostic tests for panel models). The choice is between the linear least squares method (OLS) and an estimator with fixed or random effects (FE or RE). The results of the Wald test indicate the use of the least squares method. This suggests that it is not possible to estimate individual effects. The results of the Breusch-Pagan test points, however, to the application of an estimator with random individual effects. Finally, the Hausman test is used, where the independence of individual effects from the explanatory variables is determined. Consequently, both models (Random Effects and Fixed Effects) should generate similar results (Table 5.16).

Table 5.16 presents the comparative analysis results for models based on the least squares method and an estimator with random individual effects. Since the models return similar results in terms of impact strength and direction, one can assume that the dataset is adequate. The models contain the following lagged variables: degree of industry inward internationalisation, level of industry transaction costs, level of industry rivalry, and level of subsidies. In the first estimation, the models include lagged effects up to t-3 (years). Since the previous tests indicated a model based on OLS, in the next step a new model is estimated, which excludes the variables ruled as insignificant in the initial estimation (Table 5.17). The F test confirms that the excluded variables have no statistically significant explanatory power on the degree of industry outward internationalisation.

The general validity of the model measured by the R square value is very high as it explains 99% of the volatility of the degree of industry outward internationalisation. For comparison in studies on the degree of internationalisation of companies, where similar statistical models were used, this indicator did not usually exceed 74% (cf. e.g. Yu, 2005). White's test is applied to test for ho-

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[67] The literature analysis enabled control variables to be indicated regarding the company's degree of internationalisation. Similarly, as in the case of other factors, they are transferred to the mesoeconomic level and applied in the context of the industry-level survey.

Table 5.16. Results of parameter estimation for the OLS and RE models

Variable	OLS model					RE model				
	Beta	Standard error	Statistical t	Significance p	Significance	Beta	Standard error	Statistical t	Significance p	Significance
const.	1.069	0.022	48.102	< 0.00001	***	0.968	0.131	7.418	< 0.00001	***
T	0.266	0.005	49.248	< 0.00001	***	0.250	0.020	12.229	< 0.00001	***
TA	0.066	0.003	22.270	< 0.00001	***	0.074	0.012	6.296	< 0.00001	***
C	−0.095	0.005	−20.608	< 0.00001	***	−0.088	0.006	−19.608	0.013	**
HHI	−0.183	0.037	−4.982	< 0.00001	***	0.000	0.084	−0.004	< 0.00001	***
HHI (t−1)	0.130	0.039	3.347	0.001	***	0.024	0.031	0.779	0.437	
HHI (t−2)	−0.005	0.034	−0.151	0.880		−0.057	0.033	−1.742	0.082	*
HHI (t−3)	0.036	0.029	1.261	0.208		−0.005	0.033	−0.160	0.873	
IIDi	0.310	0.091	3.399	0.001	***	0.346	0.119	2.915	0.004	***
IIDi (t−1)	−0.023	0.082	−0.279	0.780		−0.021	0.061	−0.353	0.724	
IIDi (t−2)	−0.063	0.049	−1.278	0.202		−0.029	0.048	−0.616	0.538	
IIDi (t−3)	0.110	0.040	2.739	0.006	***	0.037	0.048	0.774	0.440	
TC	−0.021	0.047	−4.946	< 0.00001	***	−0.003	0.002	−2.572	0.013	**
TC (t−1)	−0.034	0.042	−8.574	< 0.00001	***	−0.007	0.004	−1.618	0.100	*
TC (t−2)	−0.013	0.051	−2.570	0.010	**	−0.006	0.004	−1.650	0.100	*
TC (t−3)	0.007	0.062	1.189	0.235		−0.005	0.003	−1.518	0.130	
SUB	0.017	0.017	1.041	0.298		−0.011	0.011	−1.045	0.297	
SUB (t−1)	−0.010	0.010	−1.083	0.279		0.005	0.006	0.842	0.400	
SUB (t−1)	−0.002	0.002	−1.358	0.175		0.000	0.002	−0.232	0.816	

Table 5.16 – cont.

Variable	OLS model					RE model				
	Beta	Standard error	Statistical t	Significance p	Significance	Beta	Standard error	Statistical t	Significance p	Significance
SUB (t–3)	−0.019	0.031	−0.612	0.541		−0.022	0.013	−1.717	0.087	*
GDP	1.865	0.746	2.501	0.013	**	4.440	2.413	1.840	0.066	*
S	0.000	0.000	−9.784	< 0.00001	***	0.000	0.000	−2.320	0.021	**
R^2			0.97					0.94		
Adjusted R^2			0.96					0.94		
AIC			1395.45					−293.478		
BIC			1487.63					−201.291		
HQC			1431.66					−257.266		

*** variable significant at a significance level of 1%; ** variable significant at a significance level of 5%; * variable significant at a significance level of 10%.

const. – constant,
T – industry type,
TA – industry technological advancement,
C – industry life cycle stage,
HHI – level of industry rivalry,
IIDi – degree of industry inward internationalisation,
TC – level of industry transaction costs,
SUB – level of industry subsidies,
GDP – industry's share in GDP,
S – industry size.

Table 5.17. Results of parameter estimation for the OLS models after variable exclusion

Variable	OLS model				
	Beta	**Standard error**	**Statistical t**	**Significance p**	**Significance**
const.	1.03702	0.01568	66.137	< 0.00001	***
T	0.25539	0.004031	63.352	< 0.00001	***
TA	0.070275	0.001921	36.582	< 0.00001	***
C	−0.09975	0.004412	−22.61	< 0.00001	***
HHI	−0.01998	0.00848	−2.356	0.01886	**
IIDi	0.272377	0.031976	8.518	< 0.00001	***
IIDi (t–1)	0.094937	0.031743	2.991	0.00293	***
TC	−0.2288	0.002731	−8.376	< 0.00001	***
TC (t–1)	−0.0812	0.002834	−2.864	0.00437	***
TC_(t–2)	−0.3362	0.002661	−12.637	< 0.00001	***
GDP	2.14151	0.346529	6.18	< 0.00001	***
S	−0.00015	0.00120	−12.285	< 0.00001	***
R^2	0.99				
Adjusted R^2	0.99				
AIC	1394.68				
BIC	1444.97				
HQC	1414.43				

*** variable significant at a significance level of 1%; ** variable significant at a significance level of 5%;
* variable significant at a significance level of 10%;
const. – constant,
T – industry type,
TA – industry technological advancement,
C – industry life cycle stage,
HHI – level of industry rivalry,
IIDi – degree of industry inward internationalisation,
TC – level of industry transaction costs,
GDP – industry's share in GDP,
S – industry size.

moscedasticity. The test results indicate that there is no basis for rejecting the hypothesis for the homoscedasticity of random effects, hence there is no need to use the weighted least squares method. It can therefore be assumed that the estimates obtained are unbiased, consistent and reliable.

The analysis makes it possible to verify the hypotheses presented in the research scheme. There are grounds for rejecting the H1 hypothesis (*The higher the level of industry transaction costs, the higher the degree of industry outward*

Table 5.18. The OSL model for production and non-production industries

Variable	Production industries					Non-production industries				
	Beta	Standard error	Statistical t	Significance p	Significance	Statistical error	Statistical t	Significance p	Significance	Standard error
const.	0.747	0.033	22.422	< 0.00001	***	0.219	0.014	15.211	< 0.00001	***
TA	0.030	0.003	8.954	< 0.00001	***	0.008	0.003	2.476	0.014	**
C	−0.079	0.013	−6.279	< 0.00001	***	−0.054	0.005	−11.152	< 0.00001	***
HHI	−0.037	0.023	−1.560	0.120		−0.090	0.013	−6.827	< 0.00001	***
IIDi	−0.046	0.114	−0.401	0.689		0.174	0.036	4.834	< 0.00001	***
IIDi (t−1)	0.161	0.113	1.427	0.155		0.091	0.036	2.512	0.012	**
TC	−0.012	0.007	−1.609	0.109		0.000	0.002	−0.005	0.996	
TC (t−1)	−0.030	0.007	−4.303	0.000	***	0.000	0.004	−0.074	0.941	
TC (t−2)	−0.052	0.006	−8.612	< 0.00001	***	−0.011	0.003	−3.806	0.000	***
GDP	10.777	1.021	10.552	< 0.00001	***	−0.715	0.235	−3.047	0.002	***
S	0.000	0.000	−9.165	< 0.00001	***	0.000	0.000	−10.261	< 0.00001	***
R^2			0.71					0.90		
Adjusted R^2			0.70					0.89		
AIC			986.008					1063.25		
BIC			1028.48					1106.63		
HQC			1002.91					1080.46		

*** variable significant at a significance level of 1%; ** variable significant at a significance level of 5%; * variable significant at a significance level of 10%;

const. – constant,
T – industry type,
TA – industry technological advancement,
C – industry life cycle stage,
HHI – level of industry rivalry,
IIDi – degree of industry inward internationalisation,
TC – level of industry transaction costs,
GDP – industry's share in GDP,
S – industry size.

internationalisation) as the observed relationship is negative. The level of transaction costs is the only variable that shows a very significant lag down to the *t*-2 period. This means that the degree of industry outward internationalisation is affected not only by the transaction costs of a given period, but also by its past values.

Verification of the H2a-b hypotheses is not directly possible from the estimation results presented in Table 5.17. However, even the initial results already suggest that a statistically significant relationship exists between the industry life cycle and its degree of outward internationalisation. In order to verify the H2a-b hypotheses a separate estimation, broken down into production and non-production industries, was repeated (Table 5.18).

In the case of both models, the life cycle phase results turn out to be a statistically significant determinant of the degree of industry internationalisation. However, there are grounds for rejecting H2a (*The industry life cycle phase is positively related to the degree of industry outward internationalisation in production industries*) and at the same time rejecting H2b (*The industry life cycle phase is not related to the degree of industry outward internationalisation in non-production industries*). Transferring these conclusions to the level of conceptual considerations, this may mean that contemporary businesses do not follow the sequential internationalisation model any more, which assumes internationalisation to be one of the advanced forms of strategic development and thus happens in the more advanced phases of the industry life cycle. On the contrary, theories of early internationalisation (*born-globals*) see internationalisation as a strategic move aimed at stabilising companies in foreign markets at the early stages of their existence, and thus foreign expansion happens in the earliest phases of the industry life cycle.

With reference to the H3 hypothesis (*A higher degree of industry outward internationalisation appears in production rather than non-production industries*), there are no grounds to reject it (Table 5.17). In the research model the industry type is represented by a binary variable; where 0 stands for non-production (service or other) industries, and 1 for production industries. Therefore, an analysis of the model indicates that industry type is a variable that is not only statistically significant, but also significantly explanatory regarding the variability of internationalisation.

On the basis of the analyses conducted, no grounds were found for rejecting the H4 hypothesis (*The higher the degree of industry inward internationalisation, the higher the degree of industry outward internationalisation*). Similarly to the level of transaction costs, this is a variable that shows a lag, although only to the *t*-1 period. Due to the fact that the level of industry inward internationalisation is measured with a multivariate indicator, it is not possible to indicate which individual components exert the greatest influence on the presented relationship. However, using such measures is dictated by one of the study aims.

There are no grounds for rejecting hypotheses H5 (*The more technologically advanced an industry, the higher the degree of industry outward internationalisation*). The impact of this factor on the degree of industry internationalisation is statistically significant and the direction of the relationship is confirmed. The empirical analysis shows that the more technologically advanced an industry, the more willing it is to operate abroad. Therefore, although there are still relatively few high-tech industries in Poland, their degree of internationalisation is growing rapidly. Such conclusions are also confirmed by data from Table 5.4, which indicates that the average degree of high-tech industry internationalisation is significantly higher than in other industries over the whole period analysed. Therefore, it can be concluded that Polish high-tech companies display similar characteristics and follow a similar path as their counterparts in other highly developed countries.

Results of the empirical research lead to the rejection of the H6 hypothesis (*The more concentrated an industry, the higher the degree of industry outward internationalisation*). Although the factor itself is statistically significant (however, as the only one at a level higher than 1%), the impact of this factor on the degree of industry outward internationalisation is at best small. The first estimation assumes that this variable may be lagged, but the final model only takes into account the variable with no lag. However, the observed direction of the relationship indicates that the dependence between the level of industry concentration and its degree of internationalisation is negative.

Further hypotheses (H7 and H8) will be verified on the basis of other analyses rather than the econometric models presented in this subchapter. However, before proceeding to this research stage, it is worth checking for other factors which, although not taken into account in constructing the hypotheses, may also determine the degree of industry internationalisation. Two variables, namely the size of an industry and its share in the country's GDP, are considered statistically significant. No statistical significance can be found, however, for the level of industry subsidies, which therefore, is excluded from the model. Industry size exhibits a negative impact, but the strength of this factor is almost imperceptible. Conversely, in the case of an industry's share in a country's GDP, the relationship is positive and the strength of the relation is considerable.

Summarising the verification of the H1-H6 hypotheses based on panel data for Polish industries in the years 2007-2015, it can be concluded that although most of the results for the assumed determinants were statistically significant, the expected direction of the variable relations was not always met (Table 5.19):
– the level of industry transaction costs and industry concentration level are significant in determining the degree of industry outward internationalisation but exhibit a negative relation,

– the industry life cycle is significant in determining the degree of industry out-
ward internationalisation and exhibits a negative relation in both production
and non-production industries,
– the industry type, the degree of industry inward internationalisation and the
level of industry technological advancement are significant in determining the
degree of industry outward internationalisation but exhibit a positive relation.

Table 5.19. Results of hypotheses H1-H6 verification: summary

Hypothesis	Factor statistically significant	Relationship direction
H1: The higher the level of industry transaction costs, the higher the degree of industry outward internationalisation	yes	negative
H2a: The industry life cycle phase is positively related to the degree of industry outward internationalisation in production industries	yes	negative
H2b: The industry life cycle phase is not related to the degree of industry outward internationalisation in non-production industries	yes	negative
H3: A higher degree of outward industry internationalisation appears in production rather than non-production industries	yes	positive
H4: The higher the degree of industry inward internationalisation, the higher the degree of industry outward internationalisation	yes	positive
H5: The more technologically advanced an industry, the higher the degree of industry outward internationalisation	yes	positive
H6: The more concentrated an industry, the higher the degree of industry outward internationalisation	yes	negative

5.5. Degree of industry internationalisation and level of transaction costs–the impact of economic stability

Following research based on the Delphi study, the final structure of the degree
of industry internationalisation was decided upon. The measure can take values in
the range of <0:1> where 0 stands for no international industry links and 1 stands
for solely international operations. Appendix 5 provides a list of industries with
their degree of internationalisation reference for the years 2007-2015.[68]

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[68] The Appendix includes classes and groups which undergo no further subdivision. The re-
sults are presented only for industries for which at least one value of the indicator is quantifiable.

In order to verify the H7 hypothesis that *the degree of industry outward internationalisation was higher before and after the economic crisis rather than during its occurrence*, variance analysis was applied. The grouping factor was the time reflecting the economic conditions in the country. Five groups were selected and if any differences in mean values were observed, Tukey's honest significant difference test (HSD) for equal sample sizes was used. This test is meant to compare all possible pairs of means and at the same time allows for the creation of homogeneous groups (Stanisz, 2006, p. 273). The results of the analysis are presented in Table 5.20.

Table 5.20. Analysis of variance

	SS effect	**df effect**	**MS effect**	**SS error**	**df error**	**MS error**	**F**	**p**
Degree of industry outward internationalisation	0.122	4	0.030	76.034	1215	0.0626	0.4877	0.7448

The variance analysis indicates that there are no grounds for rejecting the hypothesis of equal degree of internationalisation means for the years 2007, 2009, 2011, 2013 and 2015. The descriptive statistics for all five time points are presented in Table 5.21.

Table 5.21. Descriptive statistics for the years 2007, 2009, 2011, 2013 and 2015

	Mean	**Number of valid items**	**Standard deviation**
2007	0.32	244	0.24
2009	0.32	244	0.24
2011	0.33	244	0.25
2013	0.34	244	0.26
2015	0.34	244	0.25
Total	0.33	1220	0.25

The data does not point to significant differences in means, which suggests that the overall economic conditions do not directly influence the international operations of industries. Thus, no support is found for hypothesis H7. Since no significant differences in mean values are found, there are no indications to run a *post hoc* Tukey test.

To verify hypothesis H8 (*during the economic crisis the industry transaction costs were higher than before and after its occurrence*) a similar procedure was run on the data concerning industry transaction costs. Here the results of the

variance analysis confirm significant differences among the five time reference points (Table 5.22).

Table 5.22. Analysis of variance

	SS effect	df effect	MS effect	SS error	df error	MS error	F	p
Level of industry transaction costs	28.15	4	7.04	1045.60	1215	0.86	8.18	0.00

To establish at which time points (before, during or after the economic crisis) the level of transaction costs were the highest, a *post hoc* Tukey test was run. The results of this test are presented in Table 5.23.

Table 5.23. The HSD Tukey test: results

	{1} M = 21.32	{2} M = 19.04	{3} M = 19.67	{4} M = 18.79	{5} M = 19.64
1 {1}		0.006398*	0.000266*	0.000018*	0.000223*
2 {2}	0.006398*		0.924947	0.335294	0.910813
3 {3}	0.000266*	0.924947		0.832816	0.999999
4 {4}	0.000018*	0.335294	0.832816		0.853102
5 {5}	0.000223*	0.910813	0.999999	0.853102	

* significant differences.

The results of the HSD test confirm that grounds exist for rejecting the hypothesis of equal means. However, no support can be found for the prediction that the highest level of transaction costs was during the crisis period. A significantly higher level of transaction costs appeared only in 2007, in the time preceding the economic slowdown. This could be due to the fact that during the crisis companies sought to minimise expenses and non-production costs–including transaction costs–which were a desirable source of savings.

5.6. Changes in the degree of internationalisation of Polish industries–a qualitative overview

In the period between 2007 and 2015, as quantitative research proves, very few Polish industries underwent radical changes in terms of their degree of internationalisation. However, at the same time a more in-depth look shows that sev-

eral industries could be singled out which profoundly changed their international orientation. The following subchapters briefly discuss selected characteristics of two industries in cases where the highest increase and decrease in internationalisation was observed. This qualitative overview is intended to highlight the circumstances that led to these changes.

5.6.1. Industry with the highest increase in its degree of internationalisation between 2007 and 2015

The industry with the largest increase in its degree of outward internationalisation between 2007 and 2015 in Poland turned out to be research and experimental development in the social sciences and humanities (72.20 in PKD 2007). It includes research and development work in the social sciences, humanities or interdisciplinary fields, but where the first two categories dominate. In the industry there are 428 registered entities in Poland, however almost all employ less than 10 people (Table 5.24).

Table 5.24. Research and experimental development in the social sciences and humanities: industry characteristics 2007-2015

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of registered entities[a]	3	3	4	3	3	5	6	6	7
Number of bankruptcy or insolvency proceedings	2	n/a	0	2	1	1	1	0	2
Employment level (persons)	63	n/a	65	70	98	185	242	274	301

[a] – entities employing more than 9 persons.
n/a – data not available.
Source: Based on the PontInfo Gospodarka database (accessed 3.12.2017).

The industry experienced high growth dynamics, manifested not in the number of registered entities, but in the number of employees. In 2007, only 63 employees were employed in the industry, whilst in 2015 the number exceeded 300 people. The revenue growth rate was also impressive–from less than PLN 1 mln in 2007 to over PLN 87 mln in 2015. Also, the net profit rate increased from approximately 1% in 2007 to 13% in 2013 and remained stable thereafter. The economic crisis did not seem to affect the operations of this industry in any visible way.

Poland is the fourth country in terms of the number of entities registered within the industry in Europe. Poland is ahead of countries such as Russia, the

United Kingdom and Hungary (Chart 5.2). The size structure is dominated by small companies with an 87% share, while medium-size companies account for 12%, and large ones for only 1%.
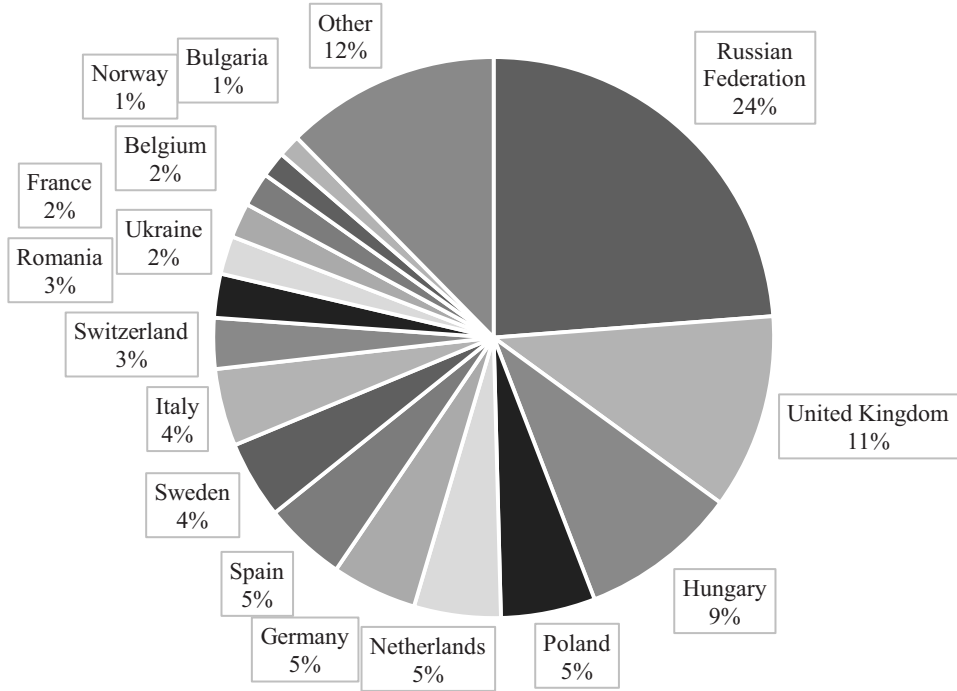
Chart 5.2. **Research and experimental development in the social sciences and humanities in Europe**

The results do not add to 100% due to rounding off the values.

Source: Based on the Burean van Dijk (n.d.) (accessed 3.12.2017).

Along with the dynamic development of the industry, its orientation towards foreign markets is also noticeable. The synthetic measure for the degree of outward internationalisation in 2007 amounted to 0, which in practice meant that this industry was focused only on the domestic market. Despite the fact that in 2009, i.e. during the economic crisis, this industry recorded an increase in the measure, in subsequent years (2010 and 2011) the degree fell again to a level of 0. Only since 2012 has the measure started to increase strongly. The main component contributing to the level achieved in 2015 (score of 0.47) were revenues generated in foreign markets (Table 5.25).

Unfortunately, in terms of geographical coverage, there is no information as to which countries were the preferred directions for companies' foreign expansion. Hence, it is difficult to determine whether an increase in the intensity of

Table 5.25. Research and experimental development in the social sciences and humanities: internationalisation characteristics 2007-2015

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Degree of industry outward internationalisation	0.00	n/a	0.32	0.10	0.00	0.55	0.41	0.38	0.47
Industry structure	0	n/a	1	1	0	3	2	2	2
Internationalisation intensity	0	n/a	0.48	0	0	0.73	0.62	0.56	0.76
Entry mode	0	n/a	0	0	0	0	0	0	0

n/a – data not available.
Source: Based on the PontInfo Gospodarka database (accessed 3.12.2017).

internationalisation is also accompanied by an increase in the width of internationalisation.

Research and experimental development on the social sciences and humanities belongs to Division 72, i.e. Scientific research and development. Although this industry does not exhibit all the features of a growth phase industry, it most certainly does belong here. The growth rate achieved by the industry is relatively high, which is also reflected in the growing and now steady profitability rate. The number of entities with an established market position is stable; however, as the data shows the number of micro-companies emerging in recent years is on the rise. This is a result of the low perceptions regarding both entry and exit barriers in the industry. Most companies in the industry gain their competitive edge not by reducing costs but by implementing innovations–in their cases, organisational ones (Table 5.26).

Table 5.26. Research and experimental development in the social sciences and humanities: industry life cycle phase characteristics

Criteria	Industry characteristics	Comments
Domestic market growth rate	high	the average growth rate is 15%
Profitability rate	stabilising	the average net profit rate is 13%
Registered companies	stable	changes visible in existing competitors' structure (their size and market shares)
New entries	numerous; micro-companies	low entry and exit barriers
Innovations	commonly available	prevailing organisational innovations

Unfortunately, due to statistical confidentiality, it is not possible to determine the degree of industry inward internationalisation (Table 5.27). Fragmentary data indicate that the number of entities with foreign capital is small, as well as the number of importers. However, due to a lack of information on revenues generated by foreign capital, the multivariate measure cannot be estimated.

Table 5.27. Research and experimental development in the social sciences and humanities: degree of internal internationalisation 2007-2015

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Degree of industry inward internationalisation	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Companies controlled by foreign equity	n/a	n/a	1	1	n/a	2	1	1	1
Foreign-owned companies' revenues in domestic market vs. total revenues in domestic market	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Importers	0	n/a	2	1	0	1	1	2	2

n/a – data not available.
Source: Based on the PontInfo Gospodarka database (accessed 3.12.2017).

In order to determine the factors leading to an increase of industry internationalisation in the recent years, representatives from three companies[69] were contacted. They listed the following as the main reasons for such an increase:
– governmental and international subsidies aimed at international cooperation,
– pressure of foreign entities in the domestic market,
– changing cost structure, including growing costs of customer service,
– pressure from existing customers to establish an international cooperation network.

5.6.2. Industry with the highest decrease in its degree of internationalisation between 2007 and 2015

The industry with the highest decrease in its degree of outward internationalisation between 2007 and 2015 in Poland turned out to be the growing of pome fruits and stone fruits (01.24 PKD 2007). In the Polish business classification this covers the cultivation of apples, apricots, cherries, peaches, nectarines, pears, quince, plums, blackthorn, and other trees and shrubs of pome and stone fruit. The industry includes a total of 188 business entities, with almost all company units employing less than 10 people (Table 5.28).

The industry is relatively small as the main companies employ only about 250 people. In 2007, revenues from the sale of products exceeded PLN 63 million, while in 2015 they increased to over PLN 89 million. The worst sales result was obtained in 2008, when revenues dropped to only PLN 46 million.

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[69] Three representatives of companies employing more than 9 persons were selected, thus representing companies that had a real impact on the formation of the degree of industry outward internationalisation.

Table 5.28. Growing of pome fruits and stone fruits: 2007-2015 internationalisation characteristics

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of registered entities[a]	8	7	9	12	12	12	8	10	9
Number of bankruptcy or insolvency proceedings	2	1	2	4	n/a	3	0	2	1
Employment level (persons)	252	262	340	363	n/a	265	226	251	208

[a] – entities employing more than 9 persons.
n/a – data not available.
Source: Based on the PontInfo Gospodarka database (accessed 3.12.2017).

The Polish industry is the ninth in terms of the number of registered entities in Europe, after the Netherlands, Ukraine, Bulgaria, Spain, Portugal, Belgium, Hungary and France (Chart 5.3). Over 87% of of those companies are firms employing less than 9 employees, approximately 12% are medium-sized companies, and only 1% are large companies. The largest companies are concentrated in Ukraine.

Despite the relatively small size of the industry in Poland its degree of internationalisation was initially quite high, and before the economic crisis it amount-
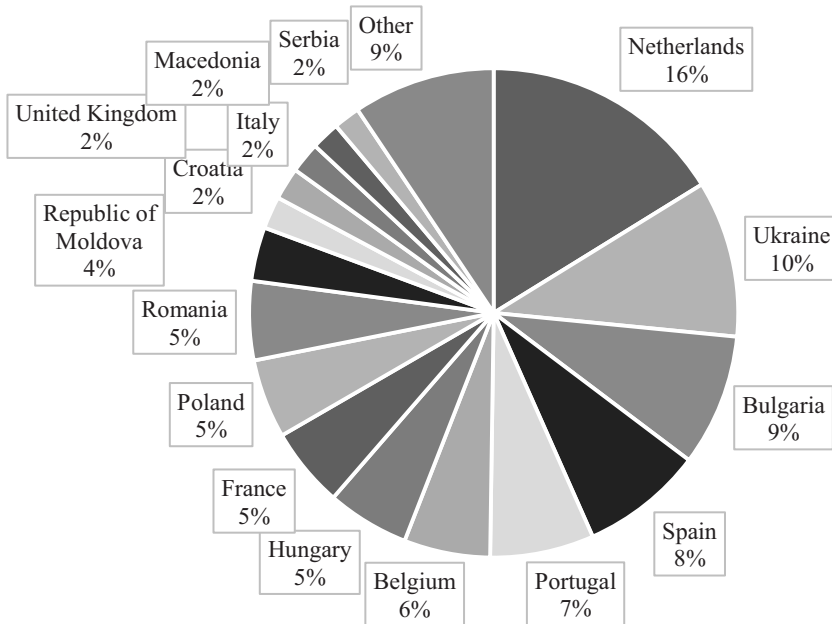
Chart 5.3. Growing of pome fruits and stone fruits in Europe

The results do not add to 100% due to rounding off the values.
Source: Based on the Bureau van Dijk (n.d.) (accessed 3.12.2017).

ed to 0.54 (Table 5.29). In subsequent years this indicator steadily decreased, reaching a score of only 0.14 in 2015. Throughout the analysed period the internationalisation of companies only took place in a non-equity form, because companies did not undertake foreign direct investments. Such a significant decrease in the degree of internationalisation is, however, the result of a decrease in the number of exporters and the revenues generated from foreign operations. In 2014 and 2015, only one company undertook active operations in foreign markets, and the share of this activity in the structure of its income was 34% and 22%, respectively.

Table 5.29. Growing of pome fruits and stone fruits: 2007-2015 internationalisation characteristics

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Degree of industry outward internationalisation	0.54	0.46	0.51	0.42	n/a	0.30	0.22	0.20	0.14
Industry structure	6	5	6	6	n/a	5	2	1	1
Internationalisation intensity (%)	62	50	62	53	n/a	35	29	34	22
Entry mode (%)	0	0	0	0	n/a	0	0	0	0

n/a – data not available.
Source: Based on the PontInfo Gospodarka database (accessed 3.12.2017).

The main expansion direction for companies in this industry was Europe; however, the share of this continent in the geographical structure of exports has been steadily decreasing – from 81% in 2007 to 66% in 2015 (with the largest fall in 2014 to 47%) (Table 5.30). The decrease in the share of European sales was primarily offset by the growing sales to North America and, to a lesser extent, Asia.

Table 5.30. Main internationalisation destinations 2007-2015

	2007	2008	2009	2010	2011	2012	2013	2014	2015
	(%)								
Europe	81	74	82	72	70	73	68	47	66
North America	10	20	11	23	22	14	19	41	22
Asia	7	5	5	4	6	10	11	10	10
Africa	2	1	2	1	2	2	1	1	2
Other	0	0	0	0	0	1	1	1	0

The industry of growing pome fruits and stone fruits belongs to Division 01, i.e. Crop and animal production, hunting and related service activities. The industry is currently in the maturity stage. This means that the domestic market

is slowly becoming saturated, and the demand for products is no longer growing at a rapid pace (Table 5.31). The structure of companies operating within the industry is stable–there are few new entries as the profitability rate in the industry is not attractive to potential investors. Companies declare low production costs mainly due to transaction scale and frequency.

Table 5.31. The growing of pome fruits and stone fruits: industry life cycle phase characteristics

Criteria	Industry characteristics	Comments
Domestic market growth rate	stable	the average growth rate is 3%
Profitability rate	decreasing	the average net profit rate is 4%
Registered companies	stable	no major changes in industry structure
New entries	few	most of the companies founded in 1990s
Technology in use	standard	few innovations

The industry's degree of internal internationalisation between 2007 and 2015 was stable and much lower than the outward degree (Table 5.32). The highest score was noted in 2008 and then in 2013; however, in general the values recorded were quite similar and ranged from 0.10 to 0.16. All three components of the internal internationalisation measure were stable in the whole period analysed. This means that the economic slowdown did not influence the decisions made by the foreign companies to invest in Poland, neither did it change the structure of importers or the revenues generated by foreign equity in the Polish market.

Table 5.32. Growing of pome fruits and stone fruits: internal internationalisation degree 2007-2015

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Degree of industry inward internationalisation	0.12	0.16	0.10	0.12	n/a	0.12	0.15	0.10	0.14
Companies controlled by foreign equity	1	1	1	1	n/a	1	1	1	1
Foreign-owned companies' revenues in domestic market vs. total revenues in domestic market (%)	10.7	9.1	8.6	10.7	n/a	10.9	9.5	10.8	10.4
Importers	1	2	1	2	n/a	2	2	1	2

n/a – data not available.
Source: Based on PontInfo Gospodarka database (accessed 3.12.2017).

Based on direct interviews with representatives from three companies in the industry,[70] an attempt was made to identify the main reasons for the decline in the degree of internationalisation. The companies agreed that within the analysed period there was indeed a visible decrease in their foreign engagement. They indicated the following as the major factors for such a turn of events:
– lack of pressure in the domestic market and sufficient domestic demand,
– insufficient company resources to actively seek development opportunities in foreign markets,
– growing negotiating edge on the part of foreign recipients,
– product perishability and related logistical restrictions.

5.7. Internationalisation of Polish industries and governmental aid

Under the Smart Growth Operational Programme 2014-2020, actions regarding industry promotion programmes are planned. These are programmes addressed to companies conducting business activities in Poland, possessing the status of an SME and offering a product that is competitive in comparison to other companies operating in the same industry. This support is targeted only at selected industries and aims at supporting companies in increasing their degree of internationalisation, and thus increasing the degree of internationalisation of the entire industry. The aid is geographically focused and includes such markets as Kazakhstan, Azerbaijan, Russia, Iran, Ukraine, UAE, Turkey, Norway, China, Australia, America, Canada, Mexico, South Africa, Brazil, Japan, South Korea, Israel, Singapore, Vietnam, India and Indonesia.[71] As can be easily seen, industry support includes expansion into non-EU markets, i.e. those markets that potentially generate more barriers for initiating international cooperation (PARP, 2017a). Additionally, a prospective market development programme is run in parallel, which includes aid for companies that engage with Algeria, India, Iran, Mexico and Vietnam.

The aid is directed to the following industries: biotechnology and pharmaceuticals, construction and finishing activities, production and sales of cars and aircraft parts, production and sales of machinery and equipment, fashion, IT/ICT, production and sales of yachts and sporting boats, cosmetics, furniture, Polish

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[70] Again, three representatives of companies employing more than 9 persons were selected, thus representing companies that had a real impact on the formation of the degree of industry outward internationalisation.

[71] The scope of geographical support varies depending on the industry.

speciality food, health services, and the production and sales of medical equipment. All these industries are categorised as areas of activity with "high competitive and innovative potential" (PARP, 2017a, p. 2), hence they are considered worthy of investment in terms of international operations.

When comparing the list of all the industries covered by the support programme with their degree of outward internationalisation it turns out that their willingness to expand is very diverse. Support goes to both highly-internationalised industries (scores around 0.6) and those that are barely initiating foreign cooperation (scores around 0.05). However, what is important, almost all of the industries included already have some experience in international cooperation, i.e. the measure of their degree of outward internationalisation is greater than 0. If one compares the number of industries covered by government support with the typology of industries examined in subchapter 5.3, it turns out that it is easy to see the pattern of granting aid (Chart 5.4).
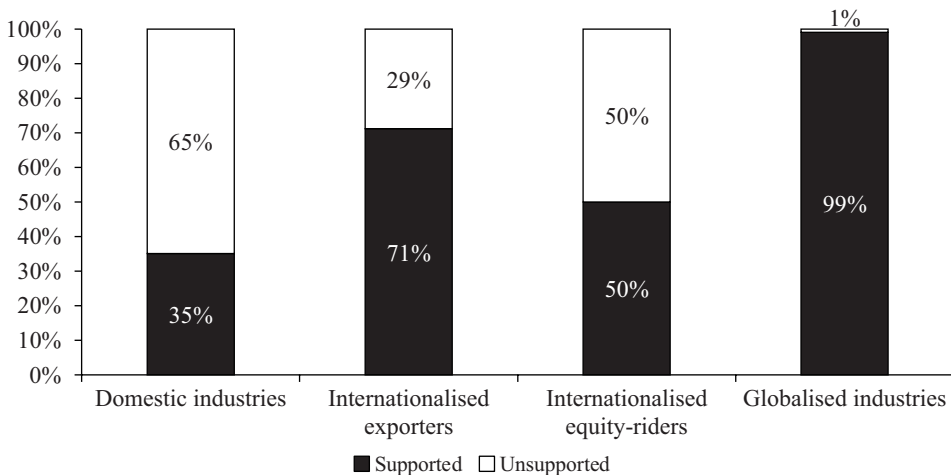
Chart 5.4. Industries covered by industry promotion activities divided into types of internationalisation

In total, the support programme covers 242 industries, including service (59), production (173) and other (10) activities. As shown in Chart 5.4, the most numerous group are the globalised industries[72] (a total of 80 industries). However, it is the relative value; that is the share of industries covered by support within the overall number of industries of a given type which provides more information. In the case of globalised industries, almost all industries participate in the support programme. At the same time internationalised exporters are also characterised by high support, which covers approximately 71% of the industries

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[72] The industry assignment into the types distinguished followed the most recent dataset, i.e. 2015 data.

(35). Noticeably less support is offered to domestic industries (35%, 61 industries) and internationalised equity-riders (50%, 17 industries).[73] This comparison is important since it shows that support is in fact to a large extent provided to industries that already show a certain stabilised degree of internationalisation. This fact does not pose any problems as even among globalised industries there are a certain number of companies that either have not started to internationalise, or have but their expansion is not advanced. It must be remembered that the criterion for granting support is not a history of foreign expansion, but the competitive and innovative potential of companies. The means of support which are the same regardless of the stage of internationalisation may be more worrying. Each participant, regardless of their own and their industry's degree of internationalisation, has at its disposal assistance in the form of participation in fairs, consultancy services, a subscription to the Export Promotion Portal, and optional participation in seminars, congresses, export training sessions, etc.

5.8. Internationalisation of Polish industries and changes in the international arena

Although in the analysis presented here the multivariate measure for the degree of industry internationalisation does not cover the width of internationalisation, i.e. its geographical scope, it cannot be denied that this aspect also affects the intensity of foreign expansion. As reported by the Statistics Poland (GUS, 2016), Polish companies operate very intensively in European markets, in particular in those that are part of the European Union (cf. Wach, 2012). Hence, it is not surprising that any changes that take place in the Common Market may be reflected in the strategies and degree of internationalisation of individual industries. In recent years Brexit has been one of the main issues giving rise to uncertainty about the future of the integration processes in Europe. On June 23rd 2017, the citizens of Great Britain voted to exit the European Union (EU), the so-called Brexit vote. This decision has increased uncertainty and has created a wide range of adverse consequences for the United Kingdom, other EU member states, and the wider region overall. A vote for Brexit could be perceived as a starting point for the third European crisis, following the eurozone debt crisis and the migration issue. The result of the referendum generated, above all, quite a large shock to the British economy. Nevertheless, for the remaining EU member states Brexit is not a zero-sum game, and will impact each state to varying degrees (Matysek-Jędrych & Mroczek-Dąbrowska, in printing). The degree to

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[73] For 49 industries there was insufficient data to determine their alignment.

which individual countries or individual industries will be affected by the consequences of Brexit depends, among other things, on the shape of future relations between Great Britain and the European Union. The following scenarios are under consideration (Matysek-Jędrych & Mroczek-Dąbrowska, in printing):

– Norwegian option, known as the EEA (European Economic Area) model (i.e. admission to the EEA with all the consequences),
– Swiss option, resulting in the signing of dozens of bilateral agreements negotiated between the UK and the EU,
– Turkish option (i.e. creation of a custom union between the UK and the EU),
– WTO option, using the WTO's MFN (Most-Favoured-Nation) principle to arrange trade relations between the UK and the EU).

Table 5.33. Possible scenarios for designing a post-Brexit relationship between the UK and the EU

Scenario	Features of arrangement (UK perspective)
Norwegian option (EEA)	– free movements of goods, services, capital and people–full access to the EU internal market – customs union in trade relations outside the EU – contribution to the EU budget – not being a part of selected policy areas, such as the Common Agricultural Policy or Common Fisheries Policy – obligation to adopt EU standards and regulations with highly limited influence on EU decision making – possibility of applying safeguard measures ('emergency break') of the EEA agreement
Swiss option	– continuation of the free movement of goods (but not necessarily services, capital or people) – operating outside the EU customs union – need for trade agreement with individual EU countries (separate negotiation of FTAs) – contribution to the EU budget – lack of passport rights for banks – highly limited influence on regulation
Turkish option	– access to most of the EU internal market (with the exception of the financial sector) under the condition of signing up to all relevant rules – acceptance of the EU external tariffs for non-EU trade, without influence or guaranteed access to these markets – highly limited influence on regulation
WTO option (MFN)	– UK-EU trade subject to the EU's common external tariff – no need to agree on regulations or common standards – non-tariff barriers may emerge over time (damaging trade in services in particular)

Source: (Matysek-Jędrych & Mroczek-Dąbrowska, in printing).

The four fundamental pillars of the EU common market are the free trade of goods, the free trade in services, the free flow of capital, and the free movement of persons. The adoption of any solution except the Norwegian option will result in overthrowing these principles, and this may have negative consequences for those industries for which the UK is an important trading partner or investment destination.[74] Unfortunately, there is no detailed information about the trading exchanges between Poland and Great Britain in the field of services; hence in analyzing the potential impact of Brexit on the situation of industries one can only rely on data on manufacturing industries.[75] Referring to the sections in the PKD 2007 classification[76] it should be noted that the United Kingdom is an important export direction for several activities (Chart 5.5).
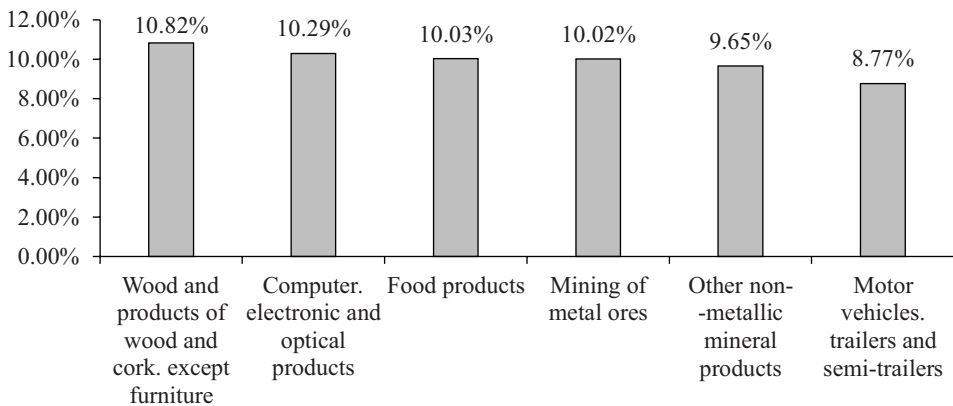
Chart 5.5. Share of exports to the United Kingdom compared to total exports of a given division in 2015

Source: Based on OECD (n.d. (a)) (accessed 4.05.2018).

In terms of the intensity of internationalisation, industries related to the production of wood and cork products (with the exception of furniture); followed by computer, electronic and optical products; appear to be the most exposed to Brexit consequences. However, the differences between the percentages of each individual division are not large; hence it can be assumed that all of the activi-

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[74] Due to the fact that investment revenues in the United Kingdom did not exceed 1% of total investment revenues in Europe in 2015 (NBP, 2017), the data on capital flows are not taken into account for the purpose of these considerations.

[75] There is a list of international trade in services under the Extended Balance of Payments Services classification (EBOPS); however, this classification does not coincide with the PKD 2007 classification used here.

[76] Despite the possibility of analysing production industries, the majority of databases on foreign trade refer to the Standard International Trade Classification (SITC). This classification is based on product delimitation and is not an economic activity approach. Therefore, the data obtained from the OECD database will not be detailed, i.e. they will not rely on classes.

ties in Chart 5.4 are exposed to a high risk of their degree of internationalisation decreasing as a result of Great Britain leaving the European Union. If these values are cross-referenced with the degree of internationalisation of individual divisions,[77] it would appear that most of them show high internationalisation scores (Table 5.34).

Table 5.34. The degree of internationalisation for the divisions most exposed to Brexit's consequences

Division	Share of exports to the UK in total exports (%)	Degree of internationalisation
Wood and products of wood and cork, except furniture	10.82	0.57
Computer, electronic and optical products	10.29	0.56
Food products	10.03	0.47
Mining of metal ores	10.02	n/a
Other non-metallic mineral products	9.65	0.28
Motor vehicles, trailers and semi-trailers	8.77	0.83

n/a – data not available.

This may mean that if the current level of exports to the United Kingdom is not maintained, for instance due to changes in legal regulations in the import and export of goods, individual industries can be significantly affected in terms of their degree of internationalisation. However, it is possible that the loss of revenues in the British market will be compensated by additional revenues in already existing or new foreign markets.

The Brexit *casus* has caused significant disruption among European nations and created enormous doubt about the future of the European Union. With the UK leaving the Common Market, questions arise whether other countries might follow suit. Although that prospect seems far away, before 2016 many felt similarly about Brexit. Though economies–exposed to the processes of globalisation–can hardly function as autarkic entities, the depth and pace of these internationalisation processes can vary according to their willingness to integrate. After the eurozone debt crisis and the migration issue, one can observe a political development on the European stage that can be summarised as the *new nationalism* (Gorynia, 2017b; Götz, Jankowska, Matysek-Jędrych, & Mroczek-Dąbrowska, 2018). Some political parties fear that relinquishing power to EU institutions undermines national sovereignty. The ongoing migration disputes, budget issues

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[77] The structure of the division for the degree of internationalisation is identical to the structure for the degree of industry internationalisation, with the only difference being a higher degree of data aggregation.

and other political and economic aspects are causes for speculations as to further withdrawals. No formal attempts to stage referendums have been taken but among the possible candidates appear to be France, the Netherlands, Hungary and Poland. Although triggered by the UK's decision, all these countries have different reasons for a shared potential endgame. Bearing in mind that the discussion is still theoretical it might be useful to analyse the impact Poland's withdrawal from the European Union (so-called *Polexit*) could cause.

Due to the degree of "dependence" Poland has on European Union markets, there is no need to analyse the industries most exposed to the negative effects of Polexit. Almost all divisions export a minimum of 70% of their production to the Common Market. The only two exceptions are the production of metal finished products excluding machines and devices (27% of exports to EU markets), and the production of other transport equipment (30% of exports to EU markets). Therefore, it can be hypothesised that the possible exit of Poland from the structures of the European Union will cause a significant decrease in the degree of internationalisation of Polish industries.

Summary

As data on the internationalisation of Polish industries shows, their degree of internationalisation is diversified but at the same time stable. A predominant number of industries show a relatively low degree of internationalisation, which does not exceed 0.2. This means that many companies still concentrate mainly on the domestic market, treating foreign operations only as a marginal economic activity. At the same time, in recent years, there has been a significant shift of moderately internationalised industries towards a global orientation. This manifests itself in the domination of equity entry modes, blurring the boundaries between the domestic and foreign markets, and changing the perception of customers and competition. This may suggest that the delimitation of industry–as it is considered in this work–is slowly ceasing to truly reflect global reality.

The degree of internationalisation achieved depends on many factors–both regarding the industry structures and its main characteristics. Whether the industry is local, global, or is somewhere in-between depends, among other things, on its type, technological advancement, life cycle phase, level of rivalry, level of transaction costs, and degree of inward internationalisation. Although each variable determines the strength of the degree industry internationalisation differently, together in a model they nonetheless describe the internationalisation strategies of the entities involved quite well.

Conclusions

The literature overview reveals that the issue of assessing the degree of internationalisation rarely constitutes a main research area. Much more often it is a side thread, simply complementing other considerations on the internationalisation process. However, if discussed at all, the vast majority of studies focus on companies and not other research units, such as industries. Nevertheless, there are numerous and important reasons that justify the relevance of the issue. The decision of industries to increase their degree of internationalisation translates into creating favourable conditions for industry members and enables them to accelerate their development. Highly internationalised industries often "force" higher innovation, productivity and competitiveness among their companies. At the same time, as an entire industry, the members contribute to increased added value, which to some extent also translates into the performance of the whole economy. The industry–located between the macro- and microeconomic perspective–is an interesting research unit and a link between the study of the behaviour patterns of individual companies and whole economies. The relatively low recognition level regarding the scope of industry internationalisation motivated the author to seek answers as to the stage of globalisation among Polish industries in recent years, and on what may contribute to increasing this degree.

According to the author, the relatively low exploration of the topic is caused by several problems that mainly manifest by the following:

– The lack of a dominant theoretical concept on which research on industry internationalisation could be based. Most concepts focus on the company, treating industry as the background not the essence of consideration.
– Definition problem and the delimitation of industry. A multitude of definitions makes it difficult to decide whether there is any possibility (or even justification) for drawing the boundaries of an industry. Additionally, cross-referencing the term with economic realities and statistics leads to the necessity of compromising and applying significant simplifications, such as identifying the industry with business activities.
– Lack of transparency in understanding and creating a measure for the degree of internationalisation. By analogy to company foreign expansion, the degree of internationalisation can be understood as a simple share of exports in total sales revenues, or as an indicator referring to various dimensions of the

internationalisation process. However, it is not possible to simply transpose the indicators for the degree of company internationalisation to the mesoeconomic level.

This study attempts to address all the three difficulties identified. Firstly, in the proposed research concept the theoretical basis is the assumptions of the new institutional economics. Behavioural assumptions–which are normally attributed to companies–such as opportunism or bounded rationality, may also apply to a collective such as an industry. The new institutional economics emphasises the importance of institutions as regulators of entities' behaviour at different levels and perspectives of analysis. This approach is complemented by a model of the forces of industry globalisation according to Yip (1989), which serves as an important tool in outlining the hypotheses regarding the determinants of the degree of industry internationalisation. Being aware of the multidimensionality of the issue, the author would like to emphasise that the proposed theoretical framework does not constitute an exhaustive basis for the analysis of industry internationalisation. Many of the concepts discussed in Chapter Two might contribute to developing these theoretical foundations. However, according to the author, considering the very early phase of research on this issue and in the light of very few empirical studies, an attempt to systematise the theoretical framework of this process is not feasible. Only further work on the degree of industry internationalisation can provide a conclusive answer to the question as to which concepts explain all the aspects of the matter at hand.

The research invokes a supply approach to defining an industry which, cross--referenced with the current statistical classifications of business activity, means that an industry is understood as a class according to PKD 2007. Again, such delimitation is consistent with the new institutional economics where the research unit is transaction. Therefore, an industry consisting of a bundle of transactions refers only to those entities directly involved in the movement of goods/services. Institutions are excluded from the analysis, but they are assumed to impact the environment (e.g. the level of transaction costs) by their functioning.

The conceptualisation and operationalisation of the degree of industry internationalisation is the third challenge the author faced. Traditionally, it was assumed that an assessment of the degree of internationalisation should include its width and depth. In the case of an industry, this phenomenon would be even more complex. The width of internationalisation can be expressed through a concentration ratio or the number of countries/continents in which the industry members are present. On the other hand, the intensity may also mean the revenues generated in foreign markets or the dominant entry mode. However, an additional dimension that does not occur in the case of micro-level analyses is the engagement of companies in the internationalisation process, i.e. an assessment of how many companies of a given industry participate in this process compared

to the overall number of industry members. Taking this aspect into consideration provides an opportunity to evaluate the industry structure in terms of the type of its participants.

As a consequence of the adopted assumptions, an original measure of the degree of industry internationalisation was designed based on the intensity of internationalisation and reflecting the structure of a given industry. Due to a lack of data, it is impossible to include the aspect of the width of internationalisation. The proposed indicator is universal and can be used in further studies. One of the efforts undertaken by the author is to include weights for the individual components of the proposed measure. For this purpose, a Delphi survey was conducted among representatives of various industries. Managerial experience allows the construct to be enriched with an aspect that simple statistical methods are unable to capture–an understanding of the complexity of the internationalisation process.

Realising the aims of the study was a multifaceted process that had to reflect the specifics of all previously discussed aspects and also consider existing limitations. As a consequence, the first of the objectives–a diagnosis of the degree of industry internationalisation in Poland–has been successfully implemented. In Poland, local industries still dominate, i.e. those for whom foreign activities are not a priority. Although these industries are internally diversified, non-production activities with low technological advancement dominate. Still, among this group one can find examples of highly profitable industries (e.g. some of the activities relating to information services). Despite expectations, the number of local industries did not decrease over time. A change is visible however but it concerns rather the degree of internationalisation, where a shift from "average" internationalisation to high internationalisation, and even globalisation, is clearly observable.

In analysing the degree of industry internationalisation an obvious question arises, what determines that some industries are more prone to internationalise and others not. This question was converted into another research goal. Although the research scheme to a large extent refers to transaction costs and the new institutional economics, there are also other factors related to Yip's forces of globalisation. Significantly, all of the analysed factors are so-called *push factors*. Empirical analysis showed that there are many interdependent determinants of the degree of internationalisation–its structure (level of rivalry, degree of industry inward internationalisation, industry size), specificity (type, technological advancement, transaction costs) or location in the value chain (importance for the economy, life cycle stage). However, the directions of these relationships do not always coincide with what the literature suggests.

The degree of industry internationalisation turned out to be immune to the occurrence of the economic crisis. This means that the unfavourable conditions

in foreign markets did not force companies to limit their foreign operations. The companies either managed to maintain their previous involvement or, in searching for new expansion directions, compensated for losses in some markets with profits in others. However, since the aspect of the width of internationalisation has not been discussed here, this issue remains unexplained.

Considering the results, the author's attention was directed towards some other questions, resulting partly from interest in the topic and partly from the answers obtained and which may constitute future research areas. What impact do *pull factors* exert on the degree of industry internationalisation? Is their influence, if it exists, independent of the home country effect? Do all economies show a similar degree of industry internationalisation? What is the impact of country specific experiences (e.g. transformation, deep political and economic changes) on the process? Finally, has progressive globalisation really led to the creation of truly global industries, and if so, what are the consequences of this phenomenon for its industry members? New questions are born. Despite of what has been revealed, the industry internationalisation issue is still a poorly recognised area. It is natural, therefore, that in the face of the first answers, further doubts arise, which will hopefully lead to a deeper understanding of the phenomenon in question.

Appendix 1

Delphi method study–questionnaire

All survey questions are aimed at determining the relevance of selected factors in the process of industry internationalisation. The constructed measures are to be universal, i.e. it must be possible to apply them in the assessment of all industries regardless of their type (production and non-production ones). The study will exclude:

– Section P, Education–in regard to school activities,
– Section T, Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use–entirely,
– Section U, Activities of extraterritorial organisations and bodies–entirely.
  Below is a glossary of terms used in the survey.

Degree of industry outward internationalisation measure indicates to what extent companies registered in Poland (in a given industry) base their activities on foreign markets.

Degree of industry inward internationalisation measure indicates to what extent the industry is dependent on the capital and decisions of foreign investors.

Round 1
Please indicate (in percentage) how important the factors are to you in the assessment of the degree of industry outward internationalisation

Factor	Industry structure[a]	Geographical scope[b]	Internationalisation intensity[c]	Entry mode[d]
Weight (%)				

Total weights must sum up to 100%.
[a] number of companies active in foreign markets to the overall number of companies in the industry,
[b] dominant number of foreign locations industry companies are active in,
[c] foreign industry sales revenues to overall industry revenues,
[d] dominant entry modes (equity vs. non-equity) expressed by a dummy variable.

Additional remarks
……………………………………………………………………………………
……………………………………………………………………………………

Please indicate (in percentage) how important the factors are to you in the assessment of the degree of industry inward internationalisation

Factor	Industry's owner-ship structure[e]	Foreign-owned companies' revenues in domestic market[f]	Importers
Weight (%)			

Total weights must sum up to 100%.
[e] number of companies with foreign capital (>50%) to overall number of companies in the industry,
[f] revenues of the companies with foreign capital in the domestic market to the overall industry revenues in the domestic market,
[g] number of importers to the overall number of companies registered in the industry.

Additional remarks
…………………………………………………………………………………………………
…………………………………………………………………………………………………

Round 2 (only changes in the outward measure part)

Since it is not possible to take into account the geographical aspect of the industry internationalisation (due to the data unavailability), please indicate the significance of other factors in the overall assessment of the industry internationalisation.

Please indicate (in percentage) how important the factors are to you in the assessment of the degree of industry outward internationalisation

Factor	Industry structure[a]	Geographical scope[b]	Internationalisation intensity[c]	Entry mode[d]
Weight (%)		Excluded		

Total weights must sum up to 100%.
[a] number of companies active in foreign markets to the overall number of companies in the industry,
[b] dominant number of foreign locations industry companies are active in,
[c] foreign industry sales revenues to overall industry revenues,
[d] dominant entry modes (equity vs. non-equity) expressed by a dummy variable.

Appendix 2

Respondents in the Delphi method study–overview

PKD	Industry	Company size[a]	Respondents number	Position in company	Years of professional experience
Section B					
08.99	Other mining and quarrying n.e.c.	Very large	1	Branch Director	27
Section C					
10.89	Manufacture of other food products n.e.c.	Very large	1	Sales Director	8
20.30	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	Large	1	Vice President of the Board	11
21.20	Manufacture of pharmaceutical preparations	Very large	1	Sales Director	10
22.23	Manufacture of builders' ware of plastic	Medium sized	1	Regional Director	5
25.11	Manufacture of metal structures and parts of structures	Medium sized	1	Sales Manager	20
28.25	Manufacture of non-domestic cooling and ventilation equipment	Very large	1	CEO	13
29.10	Manufacture of motor vehicles	Very large	2	Product Manager	6
		Very large		Foreign Market Director	12
29.31	Manufacture of electrical and electronic equipment for motor vehicles	Very large	1	Production Director	8
29.32	Manufacture of other parts and accessories for motor vehicles	Very large	1	Sales Manager	10
30.92	Manufacture of bicycles and invalid carriages	Medium sized	1	CEO	25
31.09	Manufacture of other furniture	Large	1	Head of the Quality Management	8

33.20	Installation of industrial machineryand equipment	Large	1	CEO	10
	Section D				
35.22	Distribution of gaseous fuels through mains	Large	1	CFO	12
	Section G				
46.34	Wholesale of beverages	Very large	1	Sales Manager	7
46.74	Wholesale of hardware, plumbing and heating equipment and supplies	Medium sized	1	CEO	11
47.11	Retail sale in non-specialised stores with food, beverages or tobacco predominating	Small	1	CEO	15
47.77	Retail sale of watches and jewellery in specialised stores	Very large	1	Product Development Manager	10
	Section J				
62.02	Computer consultancy activities	Very large	2	CEO	8
		Large		Sales Manager	10
	Section M				
70.22	Business and other management consultancy activities	Small	2	Branch Director	8
		Small		CEO	12
	Section N				
74.90	Other professional, scientific and technical activities n.e.c.	Small	1	CEO	12
	Section Q				
86.22	Specialist medical practice activities	Large	1	Sales manager	12

[a] Very large–Operating Revenue ≥ 100 million EUR; Total assets ≥ 200 million EUR; Employees ≥ 1,000.
Large–Operating Revenue ≥ 10 million EUR; Total assets ≥ 20 million EUR; Employees ≥ 150; Do not belong to "Very Large" category.
Medium-sized–Operating Revenue ≥ 1 million EUR; Total assets ≥ 2 million EUR; Employees ≥ 15; Do not belong to either "Very Large" or "Large" categories.
Small–remaining ones, not included in other categories.
Details on exceptions to the classification are available in the Amadeus database under "Company size categories".

Appendix 3

Notes on the consolidation of financial statements

The entity's financial statement includes (Gabrusewicz & Samelak, 2009):
– introduction to financial statement,
– a balance sheet or statement of financial position,
– an income statement or statement of comprehensive income, statement of revenue & expense, P&L or profit and loss report,
– a statement of changes in equity or equity statement or statement of retained earnings,
– a cash flow statement,
– additional information and remarks.

While estimating transaction cost level, the type of financial statements in use and in this case in particular the profit and loss account are very important. Links between entities can be considered both in terms of location and activity scope (Table A.1).

Table A.1. The system of administrative and statistical units

	One or more locations	A single location
One or more activities	Enterprise Institutional unit	Local unit
One single activity	KAU UHP	Local KAU Local UHP

Source: (Eurostat, 2008a, p. 23).

Depending on the legal nature and activities performer–the following units are distinguished in statistical datasets (GUS, 2006):
– Legal units–legal persons whose existence is recognised by law independently of the individuals or institutions which may own them or are members of them, or natural persons who are engaged in an economic activity in their own right.
– An enterprise is an organisational unit producing goods or services which has a certain degree of autonomy in decision-making. An enterprise can carry out more than one economic activity and it can be situated at more than one location. An enterprise may consist out of one or more legal units.
– Institutional units are units which have a complete set of accounts and autonomy of decision (e.g. private and public companies, independent cooperatives or partnerships, independent public enterprises, non-profit institutions, agen-

cies of general government); units which have a complete set of accounts and which, by convention, are deemed to have autonomy of decision (quasi--corporate enterprises) and units which do not necessarily keep a complete set of accounts, but which by convention are deemed to have autonomy of decision (households).

– Enterprise group–an association of enterprises bound together by legal and/ or financial links.

– The kind-of-activity unit (KAU) is a part of an enterprise. The KAU groups together all the offices, production facilities etc. of an enterprise, which contribute to the performance of a specific economic activity defined at class level (four digits) of the European classification of economic activities.

– The local unit is an enterprise or part thereof (e.g. a workshop, factory, warehouse, office, mine or depot) situated in a geographically identified place.

– Local kind-of-activity unit is an enterprise or part thereof (e.g. a workshop, factory, warehouse, office, mine or depot) situated in a geographically identified place and which is involved in predominantly one activity only.

– Unit of homogenous production–a single activity which is identified by its homogeneous inputs, production process and outputs.

– Local unit of homogenous production is the part of a unit of homogeneous production which corresponds to a local unit.

Enterprises that are not part of an enterprise group prepare individual reports. Enterprises that are capital-related must present consolidated statements, i.e. statements that cover the financial results of all entities within the capital group. In line with Accounting Act (Article 56),

"a parent undertaking needs not prepare consolidated financial statement if, on the balance sheet date of a financial year and the balance sheet date of the preceding year, the combined data of the parent undertaking and all the subsidiary undertakings of all levels, without any exclusions as referred to in Article 60 Sections 2 and 6 (…), meet at least two of the following conditions:

– Total average employment measured as full time jobs amounted to no more than 250 people.

– The aggregate balance sheet total did not exceed the Polish currency equivalent of EUR 7 500 000.

– The total net proceeds from sales of products and goods as well as financial operations did not exceed the Polish currency equivalent of EUR 15 000 000".

Appendix 4

Indicators used in measuring transaction costs–profit and loss account by nature

PKD 2007 Sections	Transaction cost share in operating expenses	Transaction cost share in other operating expenses	Transaction cost share in income tax	Research sample size	Control sample size	Deviation (%)
Agriculture, forestry, fishing	0.30	0.08		8	7	11
Mining and quarrying	0.27	0.07		6	4	10
Manufacturing	0.33	0.08		45	30	9
Electricity, gas, steam and air conditioning supply	0.28	0.01		10	10	12
Water supply, sewerage, waste management and remediation activities	0.42	0.02		4	4	11
Construction	0.31	0.05	Proportionally to revenues from the sales of goods and services	7	6	8
Wholesale and retail trade; repair of motor vehicles and motor cycles	0.59	0.12		33	20	13
Transportation and storage	0.41	0.03		6	3	3
Accommodation and food service activities	0.54	0.02		4	2	15
Information and communication	0.61	0.08		7	4	14
Financial and insurance activities	0.52	0.23		22	11	5
Real estate activities	0.43	0.06		12	9	12
Professional, scientific and technical activities	0.39	0.09		5	4	9
Administrative and support service activities	0.16	0.02		4	2	13
Public administration and defence; compulsory social security	0.26	0.00		4	4	13

Education	0.48			4	2	17
Human health and social work activities	0.62			2	1	16
Arts, entertainment and recreation	0.59			5	3	11
Other service activities	0.46			6	6	13
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	Industries not considered					
Activities of extraterritorial organisations and bodies	Industries not considered					

Appendix 5

Degree of industry internationalisation between 2007 and 2015

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
01.11 Growing of cereals (except rice), leguminous crops and oil seeds	0.04	0.06	0.04	0.04	0.03	0.03	0.03	0.03	0.03
01.13 Growing of vegetables and melons, roots and tubers	0.25	0.28	0.29	0.26	0.23	0.27	0.26	0.30	0.16
01.19 Growing of other non-perennial crops	0.29	0.37	0.53	0.31	0.30	0.08	0.15	0.13	0.09
01.24 Growing of pome fruits and stone fruits	0.54	0.46	0.51	0.42	n/a	0.30	0.22	0.20	0.14
01.25 Growing of other tree and bush fruits and nuts	n/a	0.59	0.60	n/a	n/a	n/a	n/a	n/a	n/a
01.28 Growing of spices, aromatic, drug and pharmaceutical crops	0.08	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
01.30 Plant propagation	0.31	0.21	0.22	0.19	0.23	0.23	0.24	0.22	0.19
01.41 Raising of dairy cattle	0.04	0.07	0.03	0.02	0.02	0.04	0.02	0.02	0.00
01.43 Raising of horses and other equines	0.11	0.10	0.11	0.09	0.12	0.10	0.09	0.07	0.07
01.46 Raising of swine/pigs	0.03	0.03	0.03	0.03	0.02	0.01	0.01	0.02	0.02
01.47 Raising of poultry	0.19	0.21	0.24	0.19	0.17	0.21	0.23	0.22	0.10
01.49 Raising of other animals	0.57	0.62	0.64	0.59	0.58	0.59	0.67	0.44	n/a
01.50 Mixed farming	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
01.61 Support activities for crop production	0.06	0.02	0.05	0.08	0.08	0.05	0.08	0.06	0.07
01.62 Support activities for animal production	0.18	0.24	0.30	0.23	0.29	0.29	0.12	0.14	0.20
01.63 Post-harvest crop activities	n/a	0.00	n/a	n/a	0.00	0.05	n/a	n/a	0.00
01.64 Seed processing for propagation	n/a	0.20	n/a	n/a	0.26	0.17	n/a	n/a	0.25
02.20 Logging	n/a	n/a	0.37	0.29	0.14	0.09	0.13	0.16	0.10
02.40 Support services to forestry	0.00	0.03	0.03	0.03	0.06	0.02	0.01	0.05	0.03
03.11 Marine fishing	0.31	0.05	0.00	n/a	n/a	n/a	n/a	n/a	n/a

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
03.12 Freshwater fishing	n/a	n/a	0.05	n/a	n/a	n/a	0.00	n/a	0.00
03.22 Freshwater aquaculture	0.07	0.10	n/a	0.10	0.10	0.10	n/a	0.10	n/a
05.10 Mining of hard coal	0.15	0.11	0.13	0.14	0.17	0.17	0.18	n/a	n/a
05.20 Mining of lignite	0.12	0.12	0.06	0.00	0.00	0.10	0.00	n/a	n/a
08.11 Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate	0.11	0.11	0.10	0.12	0.12	0.12	0.14	0.12	0.10
08.12 Operation of gravel and sand pits; mining of clays and kaolin	0.08	0.07	0.07	0.07	0.07	0.08	0.08	0.06	0.07
08.93 Extraction of salt	0.26	0.25	0.37	0.36	0.26	0.25	0.26	0.24	n/a
08.99 Other mining and quarrying n.e.c.	0.13	0.11	0.13	0.13	0.12	0.09	0.13	0.12	0.11
09.10 Support activities for petroleum and natural gas extraction	0.53	0.48	0.48	0.46	0.44	0.49	0.45	0.47	0.38
09.90 Support activities for other mining and quarrying	0.56	0.57	0.53	0.46	0.41	0.38	0.29	0.31	0.27
10.11 Processing and preserving of meat	0.35	0.35	0.37	0.38	0.41	0.42	0.43	0.43	0.44
10.12 Processing and preserving of poultry meat	0.42	0.43	0.43	0.44	0.42	0.43	0.46	0.48	0.49
10.13 Production of meat and poultry meat products	0.32	0.33	0.35	0.36	0.37	0.37	0.38	0.37	0.39
10.20 Processing and preserving of fish, crustaceans and molluscs	0.62	0.59	0.61	0.63	0.67	0.69	0.70	0.69	0.68
10.31 Processing and preserving of potatoes	0.60	0.55	0.57	0.56	0.67	0.62	0.61	0.56	0.57
10.32 Manufacture of fruit and vegetable juice	0.59	0.64	0.61	0.61	0.59	0.65	0.64	0.63	0.63
10.39 Other processing and preserving of fruit and vegetables	0.65	0.64	0.64	0.64	0.64	0.64	0.63	0.64	0.63
10.41 Manufacture of oils and fats	0.49	0.48	0.55	0.51	0.43	0.45	0.45	0.46	0.43
10.42 Manufacture of margarine and similar edible fats	0.52	0.49	0.54	0.53	0.55	0.72	0.69	0.75	0.44
10.51 Operation of dairies and cheese making	0.38	0.39	0.41	0.40	0.41	0.41	0.42	0.42	0.44
10.52 Manufacture of ice cream	0.38	0.38	0.44	0.43	0.43	0.47	0.46	0.44	0.45
10.61 Manufacture of grain mill products	n/a	n/a	n/a	0.39	0.42	0.43	0.43	0.44	0.45
10.62 Manufacture of starches and starch products	n/a	n/a	n/a	0.59	0.61	0.66	0.68	0.67	0.72
10.71 Manufacture of bread; manufacture of fresh pastry goods and cakes	0.27	0.26	0.28	0.28	0.28	0.28	0.29	0.30	0.31

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
10.72 Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes	0.57	0.55	0.63	0.62	0.63	0.61	0.61	0.61	0.60
10.73 Manufacture of macaroni, noodles, couscous and similar farinaceous products	0.36	0.38	0.36	0.35	0.38	0.38	0.37	0.40	0.42
10.81 Manufacture of sugar	0.50	0.75	0.48	0.57	0.56	0.58	0.57	0.56	0.57
10.82 Manufacture of cocoa, chocolate and sugar confectionery	0.65	0.63	0.63	0.63	0.63	0.65	0.66	0.63	0.65
10.83 Processing of tea and coffee	0.57	0.58	0.59	0.63	0.70	0.66	0.68	0.71	0.70
10.84 Manufacture of condiments and seasonings	0.47	0.45	0.44	0.46	0.47	0.48	0.52	0.52	0.54
10.85 Manufacture of prepared meals and dishes	0.49	0.60	0.63	0.62	0.41	0.31	0.33	0.35	0.34
10.86 Manufacture of homogenised food preparations and dietetic food	0.52	0.50	0.52	0.46	0.65	0.61	0.68	0.67	0.74
10.89 Manufacture of other food products n.e.c.	0.55	0.60	0.58	0.56	0.48	0.48	0.51	0.50	0.56
10.91 Manufacture of prepared feeds for farm animals	n/a	n/a	n/a	n/a	0.33	0.33	0.33	0.34	0.34
10.92 Manufacture of prepared pet foods	n/a	n/a	n/a	n/a	0.66	0.64	0.65	0.69	0.72
11.01 Distilling, rectifying and blending of spirits	0.37	0.37	0.41	0.44	0.40	0.38	0.39	0.42	0.39
11.02 Manufacture of wine from grape	0.38	0.46	0.40	0.45	n/a	n/a	n/a	n/a	n/a
11.03 Manufacture of cider and other fruit wines	0.39	0.36	0.36	n/a	0.37	0.41	0.39	0.40	0.39
11.04 Manufacture of other non-distilled fermented beverages	0.56	0.56	0.56	n/a	n/a	n/a	n/a	n/a	n/a
11.05 Manufacture of beer	0.38	0.39	0.39	0.38	0.39	0.40	0.40	0.38	0.42
11.06 Manufacture of malt	0.49	0.44	0.58	0.53	0.52	0.56	0.54	0.57	0.58
11.07 Manufacture of soft drinks; production of mineral waters and other bottled waters	0.35	0.37	0.37	0.36	0.35	0.38	0.37	0.35	0.39
12.00 Manufacture of tobacco products	0.53	0.48	0.47	0.47	0.45	0.50	0.50	0.54	0.51
13.10 Preparation and spinning of textile fibres	0.68	0.73	0.68	0.73	0.78	0.80	n/a	n/a	0.80
13.20 Weaving of textiles	0.52	0.51	0.52	0.51	0.60	0.56	0.57	0.48	0.59
13.30 Finishing of textiles	0.48	0.48	0.51	0.49	0.51	0.54	n/a	n/a	0.57

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
13.91 Manufacture of knitted and crocheted fabrics	0.58	0.56	0.54	0.55	0.54	0.54	0.57	0.54	0.53
13.92 Manufacture of made-up textile articles, except apparel	0.65	0.64	0.68	0.66	0.69	0.70	0.71	0.71	0.70
13.93 Manufacture of carpets and rugs	0.70	0.65	0.65	0.60	0.83	0.80	0.83	0.81	0.82
13.94 Manufacture of cordage, rope, twine and netting	0.63	0.64	0.61	0.64	0.60	0.57	0.60	n/a	n/a
13.95 Manufacture of non-wovens and articles made from non-wovens, except apparel	0.56	0.53	0.55	0.54	0.56	0.53	0.52	0.52	0.52
13.96 Manufacture of other technical and industrial textiles	0.84	0.82	0.76	0.81	0.78	0.80	0.80	n/a	n/a
13.99 Manufacture of other textiles n.e.c.	0.61	0.62	0.64	0.69	0.71	0.62	0.69	0.67	0.58
14.11 Manufacture of leather clothes	0.60	0.61	0.55	0.54	0.67	0.82	0.83	n/a	n/a
14.12 Manufacture of workwear	0.49	0.48	0.46	0.45	0.46	0.45	0.46	0.48	0.47
14.13 Manufacture of other outerwear	0.65	0.56	0.60	0.60	0.62	0.65	0.66	0.64	0.64
14.14 Manufacture of underwear	0.63	0.61	0.55	0.59	0.62	0.61	0.62	0.60	0.58
14.19 Manufacture of other wearing apparel and accessories	0.53	0.61	0.63	0.72	0.69	0.75	0.75	n/a	n/a
14.31 Manufacture of knitted and crocheted hosiery	0.54	0.57	0.58	0.56	0.60	0.63	0.63	0.62	0.59
15.11 Tanning and dressing of leather; dressing and dyeing of fur	n/a	n/a	0.45	n/a	n/a	n/a	n/a	n/a	n/a
15.12 Manufacture of luggage, handbags and the like, saddlery and harness	n/a	n/a	0.58	n/a	n/a	n/a	n/a	n/a	n/a
15.20 Manufacture of footwear	0.37	0.35	0.38	0.39	0.37	0.38	0.40	0.39	0.37
16.10 Sawmilling and planing of wood	0.58	0.55	0.55	0.55	0.52	0.50	0.53	0.54	0.54
16.21 Manufacture of veneer sheets and wood-based panels	0.64	0.62	0.64	0.62	0.64	0.64	0.63	0.63	0.61
16.22 Manufacture of assembled parquet floors	n/a	n/a	0.60	n/a	0.62	0.62	0.61	0.60	0.64
16.23 Manufacture of other builders' carpentry and joinery	0.61	0.57	0.60	0.59	0.56	0.57	0.60	0.63	0.60
16.24 Manufacture of wooden containers	n/a	n/a	0.62	n/a	0.61	0.59	0.60	0.60	0.58
16.29 Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	0.76	0.68	0.72	0.69	0.66	0.65	0.66	0.69	0.61
17.11 Manufacture of pulp	n/a	n/a	n/a	n/a	n/a	n/a	0.63	n/a	0.63

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
17.12 Manufacture of paper and paperboard	n/a	n/a	n/a	n/a	n/a	n/a	0.71	n/a	0.68
17.21 Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	0.49	0.47	0.50	0.48	0.48	0.49	0.48	0.49	0.50
17.22 Manufacture of household and sanitary goods and of toilet requisites	0.61	0.58	0.59	0.60	0.62	0.66	0.62	0.60	0.59
17.23 Manufacture of paper stationery	0.54	0.51	0.54	0.50	0.59	0.61	0.65	0.69	0.64
17.24 Manufacture of wallpaper	n/a	n/a	n/a	0.75	0.78	0.72	0.88	0.89	1.00
17.29 Manufacture of other articles of paper and paperboard	n/a	n/a	n/a	0.52	0.55	0.56	0.59	0.56	0.57
18.11 Printing of newspapers	0.12	0.16	0.16	0.15	0.05	0.11	0.14	0.10	0.10
18.12 Other printing	0.29	0.28	0.28	0.31	0.33	0.27	0.31	0.32	0.33
18.13 Pre-press and pre-media services	0.12	0.12	0.09	0.24	0.18	0.18	0.18	0.21	0.19
18.14 Binding and related services	n/a	0.24	0.31	0.24	0.23	0.31	0.28	0.28	0.24
18.20 Reproduction of recorded media	n/a	0.35	0.35	0.30	0.49	0.56	0.53	0.56	0.48
19.10 Manufacture of coke oven products	0.35	0.36	0.43	n/a	0.50	0.42	0.31	0.30	0.30
19.20 Manufacture of refined petroleum products	0.28	0.29	0.34	n/a	0.35	0.37	0.35	0.34	0.35
20.11 Manufacture of industrial gases	0.37	0.33	0.36	0.39	0.39	0.42	0.36	0.38	0.42
20.13 Manufacture of other inorganic basic chemicals	0.52	0.48	0.44	0.43	0.50	0.48	0.50	0.50	0.47
20.14 Manufacture of other organic basic chemicals	0.62	0.64	0.61	0.63	0.63	0.62	0.61	0.65	0.60
20.15 Manufacture of fertilisers and nitrogen compounds	0.57	0.57	0.55	0.61	0.60	0.61	0.62	0.61	0.61
20.16 Manufacture of plastics in primary forms	0.63	0.62	0.61	0.62	0.63	0.61	0.65	0.62	0.66
20.20 Manufacture of pesticides and other agrochemical products	0.60	0.54	0.56	0.63	0.59	0.76	n/a	0.60	0.62
20.30 Manufacture of paints, varnishes and similar coatings, printing ink and mastics	0.51	0.53	0.52	0.51	0.52	0.52	0.54	0.54	0.52
20.41 Manufacture of soap and detergents, cleaning and polishing preparations	0.60	0.60	0.62	0.59	0.65	0.66	0.66	0.67	0.66
20.42 Manufacture of perfumes and toilet preparations	0.69	0.68	0.68	0.68	0.65	0.69	0.70	0.72	0.72

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
20.51 Manufacture of explosives	n/a	n/a	n/a	n/a	0.67	n/a	n/a	n/a	0.75
20.52 Manufacture of glues	0.54	0.53	0.54	0.51	0.53	0.56	0.58	0.60	0.61
20.53 Manufacture of essential oils	n/a	n/a	n/a	n/a	0.73	n/a	n/a	n/a	0.76
20.59 Manufacture of other chemical products n.e.c.	0.51	0.49	0.49	0.49	0.52	0.54	0.56	0.59	0.60
20.60 Manufacture of man-made fibres	0.83	0.74	0.74	0.81	0.77	0.85	n/a	0.78	0.80
21.10 Manufacture of basic pharmaceutical products	0.28	0.23	0.29	0.22	0.22	0.33	0.23	0.23	0.21
21.20 Manufacture of pharmaceutical preparations	0.32	0.32	0.32	0.35	0.37	0.38	0.37	0.40	0.39
22.11 Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres	0.78	0.75	0.78	0.79	0.73	0.76	0.78	0.74	0.74
22.19 Manufacture of other rubber products	0.77	0.79	0.80	0.79	0.78	0.78	0.80	0.81	0.81
22.21 Manufacture of plastic plates, sheets, tubes and profiles	0.54	0.52	0.54	0.60	0.59	0.65	0.64	0.62	0.62
22.22 Manufacture of plastic packing goods	0.56	0.56	0.59	0.59	0.63	0.64	0.64	0.65	0.64
22.23 Manufacture of builders' ware of plastic	0.56	0.56	0.55	0.57	0.58	0.57	0.61	0.61	0.61
22.29 Manufacture of other plastic products	0.62	0.61	0.60	0.61	0.60	0.59	0.63	0.66	0.64
23.11 Manufacture of flat glass	0.39	0.37	0.29	0.39	0.43	0.42	0.50	0.35	0.42
23.12 Shaping and processing of flat glass	0.43	0.44	0.46	0.47	0.48	0.47	0.49	0.54	0.49
23.13 Manufacture of hollow glass	0.42	0.42	0.43	0.50	0.49	0.47	0.48	0.49	0.49
23.20 Manufacture of refractory products	0.36	0.38	0.43	0.46	0.43	0.39	0.44	n/a	n/a
23.31 Manufacture of ceramic tiles and flags	0.31	0.33	0.32	0.32	0.32	0.31	0.35	0.33	0.34
23.32 Manufacture of bricks, tiles and construction products, in baked clay	0.12	0.14	0.10	0.10	0.09	0.09	0.13	0.15	0.17
23.41 Manufacture of ceramic household and ornamental articles	0.58	0.54	0.53	0.54	0.51	0.54	0.57	0.56	0.59
23.42 Manufacture of ceramic sanitary fixtures	0.44	0.41	0.42	0.42	0.47	0.42	0.44	0.45	0.43
23.43 Manufacture of ceramic insulators and insulating fittings	0.50	0.46	0.51	n/a	n/a	0.50	n/a	0.46	n/a
23.49 Manufacture of other ceramic products	n/a	n/a	n/a	n/a	n/a	n/a	0.59	n/a	0.50
23.51 Manufacture of cement	0.26	0.27	0.18	0.21	0.24	0.20	0.19	0.18	0.19

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
23.52 Manufacture of lime and plaster	0.20	0.22	0.24	0.25	0.24	0.27	0.24	0.26	0.21
23.61 Manufacture of concrete products for construction purposes	0.12	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.13
23.62 Manufacture of plaster products for construction purposes	0.22	0.17	0.11	0.20	0.22	0.22	0.18	0.29	0.31
23.63 Manufacture of ready-mixed concrete	0.01	0.01	0.01	0.01	0.02	0.02	0.04	0.03	0.03
23.64 Manufacture of mortars	0.26	0.27	0.20	0.22	0.19	0.23	0.23	0.22	0.26
23.70 Cutting, shaping and finishing of stone	0.22	0.24	0.21	0.18	0.19	0.18	0.20	n/a	n/a
23.91 Production of abrasive products	0.56	0.62	0.60	0.60	0.62	0.62	0.66	0.63	0.64
23.99 Manufacture of other non-metallic mineral products n.e.c.	0.27	0.28	0.32	0.26	0.27	0.31	0.36	0.35	0.36
24.10 Manufacture of basic iron and steel and of ferro-alloys	0.55	0.60	0.54	0.58	0.60	0.59	0.61	0.63	0.60
24.20 Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	0.69	0.66	n/a	0.68	0.61	0.60	n/a	0.63	0.62
24.31 Cold drawing of bars	0.67	0.67	0.71	0.58	0.61	0.60	0.54	0.60	0.67
24.32 Cold rolling of narrow strip	n/a	0.66	n/a	0.70	0.65	0.48	0.50	0.48	0.54
24.33 Cold forming or folding	n/a	0.47	n/a	0.43	0.60	0.54	n/a	0.57	0.60
24.34 Cold drawing of wire	0.65	0.65	0.60	0.63	0.59	0.67	0.69	0.72	0.75
24.41 Precious metals production	n/a	n/a	n/a	n/a	n/a	0.83	n/a	n/a	n/a
24.42 Aluminium production	0.65	0.64	0.62	0.66	0.59	0.63	0.63	0.63	0.66
24.43 Lead, zinc and tin production	0.66	0.69	0.70	0.64	0.71	0.70	0.72	0.69	0.72
24.44 Copper production	0.47	0.63	0.61	0.62	0.66	0.64	0.78	0.79	0.73
24.45 Other non-ferrous metal production	n/a	n/a	n/a	n/a	n/a	0.30	n/a	n/a	n/a
24.51 Casting of iron	0.64	0.64	0.53	0.56	0.59	0.61	0.64	0.65	0.66
24.52 Casting of steel	n/a	n/a	0.51	0.53	n/a	0.59	0.59	0.59	0.58
24.53 Casting of light metals	0.74	0.77	0.79	0.83	0.77	0.81	0.81	0.80	0.77
24.54 Casting of other non-ferrous metals	n/a	n/a	0.64	0.71	n/a	0.73	0.70	0.70	0.70
25.11 Manufacture of metal structures and parts of structures	0.39	0.38	0.37	0.36	0.38	0.39	0.41	0.40	0.38
25.12 Manufacture of doors and windows of metal	0.30	0.29	0.30	0.29	0.28	0.31	0.35	0.35	0.36

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
25.21 Manufacture of central heating radiators and boilers	0.46	0.45	0.43	0.45	0.45	0.53	0.55	0.55	0.52
25.29 Manufacture of other tanks, reservoirs and containers of metal	0.54	0.53	0.51	0.51	0.49	0.55	0.56	0.53	0.55
25.30 Manufacture of steam generators, except central heating hot water boilers	0.40	0.42	0.50	0.33	0.40	0.41	0.46	0.23	0.36
25.40 Manufacture of weapons and ammunition	0.22	0.16	0.22	0.28	0.21	0.21	0.28	0.28	0.30
25.50 Forging, pressing, stamping and roll-forming of metal; powder metallurgy	0.42	0.42	0.44	0.42	0.43	0.41	0.41	0.39	0.41
25.61 Treatment and coating of metals	0.27	0.25	0.23	0.25	0.28	0.26	0.30	0.31	0.29
25.62 Machining	0.33	0.30	0.30	0.27	0.30	0.32	0.35	0.34	0.33
25.71 Manufacture of cutlery	n/a	n/a	n/a	n/a	0.23	n/a	n/a	n/a	n/a
25.72 Manufacture of locks and hinges	0.41	0.40	n/a	n/a	0.39	n/a	n/a	n/a	0.36
25.73 Manufacture of tools	n/a	n/a	0.37	0.37	0.37	0.37	0.37	0.38	n/a
25.91 Manufacture of steel drums and similar containers	0.53	0.54	0.51	0.52	0.50	0.55	0.53	0.54	0.51
25.92 Manufacture of light metal packaging	0.54	0.48	0.54	0.54	0.53	0.54	0.61	0.60	0.61
25.93 Manufacture of wire products, chain and springs	0.39	0.38	0.38	0.39	0.43	0.42	0.42	0.42	0.44
25.94 Manufacture of fasteners and screw machine products	0.36	0.43	0.47	0.50	0.54	0.58	0.58	0.56	0.59
25.99 Manufacture of other fabricated metal products n.e.c.	0.40	0.41	0.40	0.38	0.42	0.41	0.43	0.41	0.43
26.11 Manufacture of electronic components	0.51	n/a	0.31	n/a	0.37	0.29	0.34	0.33	0.50
26.12 Manufacture of loaded electronic boards	0.32	n/a	0.36	n/a	0.56	0.56	0.54	0.45	0.51
26.20 Manufacture of computers and peripheral equipment	0.30	0.27	0.30	0.25	0.31	0.34	0.31	0.41	0.40
26.30 Manufacture of communication equipment	0.43	0.45	0.48	0.53	0.54	0.59	0.57	0.60	0.62
26.40 Manufacture of consumer electronics	0.64	0.56	0.70	0.55	0.67	0.66	0.69	0.69	0.67
26.60 Manufacture of irradiation, electromedical and electrotherapeutic equipment	n/a	n/a	n/a	0.41	n/a	n/a	n/a	n/a	0.54
26.70 Manufacture of optical instruments and photographic equipment	n/a	n/a	0.58	0.41	0.38	0.45	0.48	0.51	0.49
27.11 Manufacture of electric motors, generators and transformers	0.68	0.68	0.70	0.70	0.72	0.71	0.69	0.68	0.71

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
27.12 Manufacture of electricity distribution and control apparatus	0.54	0.54	0.55	0.57	0.59	0.59	0.59	0.60	0.59
27.20 Manufacture of batteries and accumulators	0.69	0.67	n/a	n/a	n/a	0.82	0.83	0.80	0.85
27.31 Manufacture of fibre optic cables	0.83	0.78	0.72	0.71	n/a	0.69	0.72	0.67	0.63
27.32 Manufacture of other electronic and electric wires and cables	0.61	0.60	0.57	0.64	0.71	0.70	0.69	0.71	0.73
27.33 Manufacture of wiring devices	0.61	0.62	0.67	0.67	n/a	0.59	0.66	0.64	0.64
27.40 Manufacture of electric lighting equipment	0.78	0.81	n/a	n/a	n/a	0.81	0.84	0.84	0.84
27.51 Manufacture of electric domestic appliances	0.77	0.78	0.80	0.80	0.79	0.79	0.81	0.73	0.78
27.52 Manufacture of non-electric domestic appliances	0.55	0.57	0.59	0.58	0.66	0.68	0.73	0.66	0.64
27.90 Manufacture of other electrical equipment	0.62	0.60	0.64	0.60	0.64	0.62	0.64	0.66	0.67
28.11 Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	0.76	0.72	0.70	0.74	0.79	0.74	0.67	0.67	0.62
28.12 Manufacture of fluid power equipment	0.50	0.57	0.60	0.52	0.48	0.61	0.62	0.74	0.77
28.13 Manufacture of other pumps and compressors	0.53	0.55	0.49	0.55	0.61	0.60	0.66	0.71	0.72
28.14 Manufacture of other taps and valves	0.68	0.62	0.60	0.58	0.62	0.68	0.68	0.69	0.69
28.15 Manufacture of bearings, gears, gearing and driving elements	0.83	0.81	0.76	0.81	0.81	0.79	0.79	0.81	0.80
28.21 Manufacture of ovens, furnaces and furnace burners	0.70	0.67	0.67	0.61	0.70	0.71	0.66	0.70	0.67
28.22 Manufacture of lifting and handling equipment	0.59	0.57	0.56	0.52	0.54	0.57	0.58	0.66	0.65
28.23 Manufacture of office machinery and equipment (except computers and peripheral equipment)	0.51	0.39	0.38	0.39	0.39	0.43	0.33	0.34	n/a
28.24 Manufacture of power-driven hand tools	0.72	0.71	0.72	0.72	0.63	0.56	0.81	0.81	n/a
28.25 Manufacture of non-domestic cooling and ventilation equipment	0.61	0.57	0.59	0.65	0.67	0.65	0.69	0.62	0.61
28.29 Manufacture of other general-purpose machinery n.e.c.	0.57	0.58	0.58	0.60	0.62	0.66	0.70	0.67	0.67
28.30 Manufacture of agricultural and forestry machinery	0.64	0.65	0.63	0.63	0.65	0.64	0.71	0.71	0.71
28.41 Manufacture of metal forming machinery	0.72	0.74	0.74	0.71	0.77	0.79	0.83	0.80	0.77

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
28.49 Manufacture of other machine tools	0.67	0.70	0.64	0.58	0.68	0.70	0.68	0.70	0.65
28.91 Manufacture of machinery for metallurgy	0.48	0.53	0.53	0.61	0.49	0.56	0.56	0.52	0.52
28.92 Manufacture of machinery for mining, quarrying and construction	0.52	0.52	0.46	0.47	0.49	0.50	0.48	0.48	0.54
28.93 Manufacture of machinery for food, beverage and tobacco processing	0.66	0.66	0.69	0.66	0.70	0.71	0.71	0.70	0.66
28.94 Manufacture of machinery for textile, apparel and leather production	0.70	0.62	0.67	0.67	0.78	0.80	0.88	0.86	0.83
28.95 Manufacture of machinery for paper and paperboard production	0.68	0.66	0.68	0.77	0.77	0.77	0.79	0.79	0.74
28.96 Manufacture of plastics and rubber machinery	0.46	0.56	0.69	0.58	0.52	0.53	0.47	0.48	0.54
28.99 Manufacture of other special-purpose machinery n.e.c.	0.54	0.53	0.52	0.54	0.55	0.56	0.58	0.58	0.59
29.10 Manufacture of motor vehicles	0.86	0.84	0.84	0.82	0.83	0.86	0.85	0.82	0.83
29.20 Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	0.61	0.68	0.70	0.70	0.69	0.72	0.69	0.72	0.69
29.31 Manufacture of electrical and electronic equipment for motor vehicles	0.82	0.85	n/a	n/a	0.87	0.88	0.89	0.90	0.88
29.32 Manufacture of other parts and accessories for motor vehicles	0.77	0.74	n/a	n/a	0.76	0.81	0.82	0.83	0.84
30.11 Building of ships and floating structures	0.80	0.75	0.74	0.70	0.74	0.80	0.79	0.76	0.70
30.12 Building of pleasure and sporting boats	0.75	0.82	0.84	0.81	0.84	0.78	0.85	0.83	0.86
30.20 Manufacture of railway locomotives and rolling stock	0.66	0.65	0.66	0.69	0.61	0.70	0.71	0.71	0.67
30.30 Manufacture of air and spacecraft and related machinery	0.75	0.80	0.87	0.81	0.82	0.85	0.85	0.86	0.84
30.40 Manufacture of military fighting vehicles	n/a	n/a	n/a	0.43	0.40	0.43	n/a	0.51	0.43
30.91 Manufacture of motorcycles	n/a	n/a	n/a	n/a	0.80	0.87	n/a	n/a	0.82
30.92 Manufacture of bicycles and invalid carriages	0.76	0.74	0.77	0.78	0.73	0.73	0.72	0.70	0.64
30.99 Manufacture of other transport equipment n.e.c.	n/a	n/a	n/a	n/a	0.72	0.78	n/a	n/a	0.70
31.01 Manufacture of office and shop furniture	0.43	0.37	0.40	0.40	0.41	0.43	0.47	0.46	0.46

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
31.02 Manufacture of kitchen furniture	0.47	0.43	0.43	0.42	0.37	0.39	0.39	0.46	0.45
31.03 Manufacture of mattresses	0.48	0.46	0.53	0.61	0.66	0.66	0.66	0.68	0.69
31.09 Manufacture of other furniture	0.54	0.51	0.53	0.54	0.56	0.56	0.57	0.57	0.57
32.12 Manufacture of jewellery and related articles	0.29	n/a	0.28	n/a	n/a	n/a	n/a	n/a	0.23
32.20 Manufacture of musical instruments	0.71	0.69	n/a	0.64	n/a	n/a	n/a	n/a	n/a
32.30 Manufacture of sports goods	0.48	0.47	0.41	0.36	n/a	n/a	n/a	n/a	n/a
32.40 Manufacture of games and toys	0.39	0.41	0.43	0.37	0.40	0.39	0.47	0.51	0.51
32.50 Manufacture of medical and dental instruments and supplies	0.47	0.45	0.51	0.44	0.44	0.46	0.52	0.54	0.53
32.91 Manufacture of brooms and brushes	0.26	0.26	0.37	0.35	0.28	0.32	0.29	0.26	0.30
32.99 Other manufacturing n.e.c.	0.69	0.66	0.68	0.66	0.66	0.63	0.67	0.71	0.70
33.11 Repair of fabricated metal products	0.26	0.28	0.25	0.24	n/a	n/a	0.13	0.13	0.12
33.12 Repair of machinery	0.13	0.15	0.12	0.11	0.13	0.12	0.11	0.14	0.14
33.13 Repair of electronic and optical equipment	0.20	0.22	0.19	0.21	0.22	0.26	0.20	0.20	0.21
33.14 Repair of electrical equipment	0.09	0.10	0.09	0.04	0.04	0.05	0.07	0.06	0.05
33.15 Repair and maintenance of ships and boats	0.39	0.46	0.44	0.34	0.31	0.32	0.39	0.45	0.48
33.16 Repair and maintenance of aircraft and spacecraft	n/a	n/a	n/a	n/a	0.34	0.29	0.28	0.33	0.39
33.17 Repair and maintenance of other transport equipment	0.10	0.14	0.22	0.16	0.12	0.12	0.11	0.11	0.15
33.19 Repair of other equipment	n/a	n/a	n/a	n/a	n/a	n/a	0.07	0.19	0.16
33.20 Installation of industrial machinery and equipment	0.23	0.25	0.25	0.20	0.23	0.26	0.26	0.26	0.23
35.11 Production of electricity	0.06	0.04	0.03	0.04	0.06	0.05	0.05	0.06	0.07
35.12 Transmission of electricity	0.08	0.07	0.05	0.07	n/a	n/a	n/a	n/a	n/a
35.13 Distribution of electricity	0.04	0.04	0.03	0.03	n/a	n/a	n/a	n/a	n/a
35.14 Trade of electricity	0.14	0.13	0.08	0.11	0.15	0.12	0.12	0.09	0.08
35.21 Manufacture of gas	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.12	n/a
35.22 Distribution of gaseous fuels through mains	0.00	0.00	0.00	0.00	0.00	0.00	n/a	n/a	n/a

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
35.30 Steam and air conditioning supply	0.01	n/a	n/a	n/a	n/a	n/a	n/a	0.01	0.01
36.00 Water collection, treatment and supply	n/a	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37.00 Sewerage	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
38.11 Collection of non-hazardous waste	n/a	n/a	n/a	n/a	0.04	0.03	0.04	0.04	0.05
38.12 Collection of hazardous waste	n/a	n/a	n/a	n/a	0.08	0.06	0.07	0.10	0.11
38.21 Treatment and disposal of non-hazardous waste	0.04	0.03	0.04	0.04	0.04	0.06	0.10	0.10	0.08
38.22 Treatment and disposal of hazardous waste	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.07
38.31 Dismantling of wrecks	0.20	0.29	0.33	0.44	0.37	0.10	0.19	0.22	0.35
38.32 Recovery of sorted materials	0.17	0.17	0.18	0.20	0.21	0.25	0.25	0.25	0.24
39.00 Remediation activities and other waste management services	n/a	n/a	0.03	0.00	0.00	0.02	0.13	0.08	0.10
41.10 Development of building projects	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.05
41.20 Construction of residential and non-residential buildings	0.07	0.06	0.05	0.05	0.05	0.05	0.07	0.06	0.06
42.11 Construction of roads and motorways	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
42.12 Construction of railways and underground railways	0.04	0.03	0.02	0.03	0.01	0.02	0.01	0.01	0.03
42.13 Construction of bridges and tunnels	0.02	0.02	0.00	0.04	0.02	0.01	0.03	0.03	0.02
42.21 Construction of utility projects for fluids	0.05	0.04	0.03	0.03	0.03	0.03	0.04	0.03	0.04
42.22 Construction of utility projects for electricity and telecommunications	0.04	0.04	0.03	0.02	0.03	0.03	0.03	0.03	0.03
42.91 Construction of water projects	0.01	0.01	0.01	0.00	0.03	0.03	0.03	0.03	0.04
42.99 Construction of other civil engineering projects n.e.c.	0.12	0.08	0.06	0.06	0.06	0.05	0.07	0.07	0.08
43.11 Demolition	0.03	0.01	0.01	0.01	0.01	0.02	0.03	0.02	0.01
43.12 Site preparation	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00
43.13 Test drilling and boring	0.08	0.10	0.02	0.12	0.06	0.04	0.02	0.03	0.04
43.21 Electrical installation	0.04	0.05	0.04	0.05	n/a	n/a	0.06	0.05	0.04
43.22 Plumbing, heat and air-conditioning installation	0.06	0.06	0.05	0.06	0.03	0.04	0.04	0.05	0.04
43.29 Other construction installation	0.20	0.15	0.16	0.14	n/a	n/a	0.18	0.18	0.19

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
43.31 Plastering	0.05	0.04	0.02	0.00	0.00	0.04	0.02	0.02	0.04
43.32 Joinery installation	0.25	0.25	0.22	0.14	0.13	0.17	0.19	0.17	0.16
43.33 Floor and wall covering	0.12	0.08	0.12	0.07	0.06	0.02	0.05	0.03	0.04
43.34 Painting and glazing	0.05	0.00	0.03	0.05	0.04	0.07	0.16	0.08	0.19
43.39 Other building completion and finishing	0.09	0.05	0.05	0.05	0.07	0.03	0.07	0.08	0.04
43.91 Roofing activities	0.08	0.16	0.08	0.04	0.19	0.16	0.18	0.19	0.16
43.99 Other specialised construction activities n.e.c.	0.12	0.11	0.08	0.09	0.10	0.09	0.11	0.10	0.10
45.11 Sale of cars and light motor vehicles	0.07	0.06	0.12	0.09	0.09	0.09	0.09	0.08	0.09
45.19 Sale of other motor vehicles	0.21	0.19	0.19	0.12	0.15	0.20	0.18	0.16	0.15
45.20 Maintenance and repair of motor vehicles	n/a	0.05	n/a	n/a	n/a	n/a	0.08	0.08	0.08
45.31 Wholesale trade of motor vehicle parts and accessories	0.23	0.22	0.22	0.21	0.23	0.24	0.23	0.23	0.23
45.32 Retail trade of motor vehicle parts and accessories	0.16	0.15	0.15	0.11	0.09	0.10	0.10	0.10	0.11
45.40 Sale, maintenance and repair of motorcycles and related parts and accessories	n/a	0.24	n/a	n/a	n/a	n/a	0.14	0.11	0.11
46.11 Agents involved in the sale of agricultural raw materials, live animals, textile raw materials and semi-finished goods	0.31	n/a	0.29	0.40	0.23	0.10	0.13	0.32	0.25
46.12 Agents involved in the sale of fuels, ores, metals and industrial chemicals	n/a	0.14	0.20	0.19	0.23	0.17	0.19	0.24	0.32
46.13 Agents involved in the sale of timber and building materials	0.20	0.16	0.19	0.14	0.16	0.16	0.04	0.11	0.14
46.14 Agents involved in the sale of machinery, industrial equipment, ships and aircraft	0.18	0.15	0.16	0.21	0.14	0.18	0.19	0.19	0.18
46.15 Agents involved in the sale of furniture, household goods, hardware and ironmongery	n/a	0.08	0.04	0.10	n/a	n/a	0.13	0.45	0.51
46.16 Agents involved in the sale of textiles, clothing, fur, footwear and leather goods	n/a	n/a	0.24	0.06	n/a	n/a	0.08	0.12	0.08
46.17 Agents involved in the sale of food, beverages and tobacco	0.04	0.06	0.06	0.04	0.03	0.05	0.00	0.14	0.07
46.18 Agents specialised in the sale of other particular products	0.15	0.14	0.15	0.12	0.14	0.14	0.12	0.14	0.18

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
46.19 Agents involved in the sale of a variety of goods	0.22	0.18	0.14	0.15	0.17	0.17	0.16	0.16	0.14
46.21 Wholesale of grain, unmanufactured tobacco, seeds and animal feeds	0.12	0.14	0.16	0.14	0.16	0.18	0.20	0.20	0.19
46.22 Wholesale of flowers and plants	0.30	0.26	0.21	n/a	0.20	0.18	0.23	0.21	0.18
46.23 Wholesale of live animals	0.30	0.21	0.17	0.21	0.15	0.17	0.09	0.11	0.07
46.24 Wholesale of hides, skins and leather	0.52	0.51	0.50	n/a	0.30	0.44	0.49	0.53	0.49
46.31 Wholesale of fruit and vegetables	0.23	0.21	0.22	0.21	0.20	0.21	0.20	0.21	0.21
46.32 Wholesale of meat and meat products	0.19	0.20	0.17	0.17	0.16	0.16	0.13	0.21	0.20
46.33 Wholesale of dairy products, eggs and edible oils and fats	0.10	0.16	0.13	0.15	0.15	0.18	0.23	0.21	0.19
46.34 Wholesale of beverages	0.03	0.04	0.03	0.04	0.03	0.03	0.04	0.05	0.06
46.35 Wholesale of tobacco products	0.02	0.03	0.04	0.03	0.02	0.04	0.03	0.03	0.04
46.36 Wholesale of sugar and chocolate and sugar confectionery	0.18	0.18	0.20	0.19	0.18	0.18	0.17	0.30	0.20
46.37 Wholesale of coffee, tea, cocoa and spices	0.27	0.24	0.23	0.24	0.17	0.21	0.17	0.22	0.18
46.38 Wholesale of other food, including fish, crustaceans and molluscs	0.09	0.09	0.10	0.09	0.09	0.10	0.11	0.10	0.13
46.39 Non-specialised wholesale of food, beverages and tobacco	0.07	0.07	0.07	0.06	0.05	0.05	0.05	0.06	0.08
46.41 Wholesale of textiles	0.34	0.32	0.32	0.18	0.21	0.19	0.24	0.22	0.24
46.42 Wholesale of clothing and footwear	0.24	0.22	0.20	0.16	0.17	0.18	0.17	0.13	0.20
46.43 Wholesale of electrical household appliances	0.23	0.22	0.23	0.17	0.14	0.14	0.14	0.17	0.17
46.44 Wholesale of china and glassware and cleaning materials	0.20	0.18	0.16	0.17	0.15	0.18	0.22	0.21	0.23
46.45 Wholesale of perfume and cosmetics	0.16	0.15	0.16	0.15	0.12	0.13	0.16	0.17	0.16
46.46 Wholesale of pharmaceutical goods	0.12	0.11	0.12	0.13	0.13	0.13	0.15	0.16	0.16
46.47 Wholesale of furniture, carpets and lighting equipment	0.24	0.23	0.23	0.27	0.27	0.31	0.30	0.33	0.31
46.48 Wholesale of watches and jewellery	0.27	0.27	0.24	0.23	0.23	0.24	0.24	0.13	0.20
46.49 Wholesale of other household goods	0.18	0.20	0.19	0.18	0.17	0.17	0.19	0.17	0.18

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
46.51 Wholesale of computers, computer peripheral equipment and software	0.17	0.16	0.19	0.16	0.18	0.22	0.27	0.27	0.25
46.52 Wholesale of electronic and telecommunications equipment and parts	0.22	0.18	0.19	0.19	0.19	0.21	0.25	0.27	0.24
46.61 Wholesale of agricultural machinery, equipment and supplies	0.19	0.21	0.20	0.18	0.16	0.16	0.15	0.14	0.16
46.62 Wholesale of machine tools	0.19	0.21	0.20	0.18	0.14	0.13	0.13	0.13	0.14
46.63 Wholesale of mining, construction and civil engineering machinery	0.29	0.27	0.28	0.29	0.24	0.28	0.28	0.23	0.22
46.64 Wholesale of machinery for the textile industry and of sewing and knitting machines	n/a	n/a	n/a	n/a	0.51	0.33	0.33	0.48	0.37
46.65 Wholesale of office furniture	n/a	n/a	n/a	n/a	0.20	0.07	0.19	0.13	0.12
46.66 Wholesale of other office machinery and equipment	0.10	0.10	0.16	0.14	0.13	0.18	0.22	0.10	0.08
46.69 Wholesale of other machinery and equipment	0.22	0.22	0.22	0.22	0.20	0.21	0.20	0.21	0.22
46.71 Wholesale of solid, liquid and gaseous fuels and related products	0.10	0.11	0.10	0.10	0.07	0.07	0.08	0.06	0.07
46.72 Wholesale of metals and metal ores	0.20	0.21	0.21	0.21	0.18	0.20	0.23	0.27	0.23
46.73 Wholesale of wood, construction materials and sanitary equipment	0.16	0.15	0.14	0.13	0.11	0.13	0.13	0.13	0.13
46.74 Wholesale of hardware, plumbing and heating equipment and supplies	0.19	0.18	0.18	0.18	0.18	0.18	0.17	0.19	0.18
46.75 Wholesale of chemical products	0.22	0.21	0.20	0.20	0.20	0.21	0.21	0.21	0.21
46.76 Wholesale of other intermediate products	0.24	0.24	0.23	0.26	0.29	0.19	0.24	0.25	0.30
46.77 Wholesale of waste and scrap	0.24	0.23	0.20	0.21	0.19	0.20	0.21	0.20	0.15
46.90 Non-specialised wholesale trade	0.20	0.19	0.19	0.18	0.18	0.19	0.20	0.20	0.19
47.11 Retail sale in non-specialised stores with food, beverages or tobacco predominating	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
47.19 Other retail sale in non-specialised stores	0.04	0.03	0.03	0.03	0.02	0.03	0.02	0.03	0.03
47.21 Retail sale of fruit and vegetables in specialised stores	n/a	0.09	0.05	0.03	0.00	0.00	n/a	n/a	0.00
47.22 Retail sale of meat and meat products in specialised stores	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
47.23 Retail sale of fish, crustaceans and molluscs in specialised stores	n/a	0.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a
47.24 Retail sale of bread, cakes, flour confectionery and sugar confectionery in specialised stores	0.04	0.03	0.01	0.00	0.04	0.02	0.03	0.02	0.03
47.25 Retail sale of beverages in specialised stores	0.07	0.04	0.03	0.03	0.00	0.01	0.00	0.00	0.00
47.26 Retail sale of tobacco products in specialised stores	0.03	0.05	0.05	0.00	n/a	n/a	0.00	0.00	0.00
47.29 Other retail sale of food in specialised stores	0.01	0.01	n/a	n/a	0.01	0.01	0.01	0.01	0.02
47.30 Retail sale of automotive fuel in specialised stores	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02
47.41 Retail sale of computers, peripheral units and software in specialised stores	0.06	0.07	0.05	0.09	0.09	0.08	0.08	0.09	0.12
47.42 Retail sale of telecommunications equipment in specialised stores	0.05	n/a	0.05	0.02	0.03	n/a	n/a	0.06	0.05
47.43 Retail sale of audio and video equipment in specialised stores	0.13	n/a	0.13	0.21	0.11	0.13	0.13	n/a	0.17
47.51 Retail sale of textiles in specialised stores	0.06	0.11	0.17	n/a	0.10	0.13	0.14	0.09	0.06
47.52 Retail sale of hardware, paints and glass in specialised stores	0.07	0.07	0.08	n/a	0.07	0.06	0.05	0.07	0.06
47.53 Retail sale of carpets, rugs, wall and floor coverings in specialised stores	0.09	0.10	0.08	0.07	0.15	0.17	0.16	0.17	0.14
47.54 Retail sale of electrical household appliances in specialised stores	0.13	0.15	0.16	0.08	0.15	0.19	0.23	0.22	0.22
47.59 Retail sale of furniture, lighting equipment and other household articles in specialised stores	0.10	0.10	0.10	0.10	0.10	0.11	0.12	0.12	0.13
47.61 Retail sale of books in specialised stores	0.04	0.05	0.04	0.05	0.04	0.04	0.04	0.04	n/a

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
47.62 Retail sale of newspapers and stationery in specialised stores	0.01	0.02	0.05	0.05	0.05	0.06	0.08	n/a	n/a
47.64 Retail sale of sporting equipment in specialised stores	n/a	0.08	0.05	0.06	0.07	n/a	n/a	0.05	0.07
47.71 Retail sale of clothing in specialised stores	0.13	0.09	0.12	0.11	0.12	0.11	0.10	0.08	0.09
47.72 Retail sale of footwear and leather goods in specialised stores	0.08	0.06	0.08	0.07	0.06	0.09	0.12	0.11	0.07
47.73 Dispensing chemist in specialised stores	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
47.74 Retail sale of medical and orthopaedic goods in specialised stores	0.10	0.13	0.11	0.10	0.08	0.06	0.08	0.06	0.09
47.75 Retail sale of cosmetic and toilet articles in specialised stores	0.04	0.03	0.06	0.04	0.06	0.06	0.06	0.05	0.06
47.76 Retail sale of flowers, plants, seeds, fertilisers, pet animals and pet food in specialised stores	0.05	0.05	0.04	0.04	0.06	0.05	0.04	0.06	0.06
47.77 Retail sale of watches and jewellery in specialised stores	0.07	0.08	0.09	0.05	0.08	0.08	0.15	0.11	0.11
47.78 Other retail sale of new goods in specialised stores	0.07	0.08	0.10	0.08	0.07	0.08	0.08	0.09	0.07
47.79 Retail sale of second-hand goods in stores	0.12	0.10	0.08	0.09	0.20	0.15	0.15	0.14	0.05
47.91 Retail sale via mail order houses or via Internet	0.14	0.22	0.17	n/a	0.27	0.24	0.27	0.25	0.22
47.99 Other retail sale not in stores, stalls or markets	0.21	0.14	0.15	0.10	0.18	0.17	0.17	0.19	0.15
49.10 Passenger rail transport, interurban	0.07	0.06	0.07	0.00	0.00	0.04	0.03	0.00	n/a
49.20 Freight rail transport	0.14	0.16	0.17	0.20	0.17	0.22	0.18	0.22	0.20
49.31 Urban and suburban passenger land transport	0.06	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01
49.32 Taxi operation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49.39 Other passenger land transport n.e.c.	0.12	0.11	0.11	0.08	0.08	0.07	0.07	0.09	0.07
49.41 Freight transport by road	0.33	n/a	n/a	n/a	n/a	n/a	0.28	0.29	n/a
49.50 Transport via pipeline	0.53	0.59	0.55	0.57	0.57	0.57	0.54	0.57	n/a
50.20 Sea and coastal freight water transport	0.65	0.68	0.60	0.48	0.50	0.62	0.53	0.69	0.70
50.30 Inland passenger water transport	n/a	n/a	n/a	n/a	n/a	n/a	0.00	0.00	n/a
51.10 Passenger air transport	n/a	n/a	n/a	n/a	n/a	0.35	n/a	0.40	0.37
51.21 Freight air transport	n/a	n/a	n/a	0.52	n/a	0.30	n/a	0.25	n/a

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
52.10 Warehousing and storage	0.05	0.18	0.24	0.20	0.33	0.31	0.31	0.33	0.34
52.21 Service activities incidental to land transportation	0.10	0.10	0.10	0.09	0.25	0.26	0.28	0.34	0.30
52.22 Service activities incidental to water transportation	0.16	0.18	0.24	0.21	0.48	0.49	0.47	0.45	0.46
52.23 Service activities incidental to air transportation	0.26	0.08	0.13	0.16	0.34	0.33	0.33	0.32	0.35
52.24 Cargo handling	0.15	0.10	0.10	0.13	0.38	0.30	0.33	0.33	0.39
52.29 Other transportation support activities	0.28	0.29	0.29	0.24	0.45	0.46	0.52	0.50	0.51
53.20 Other postal and courier activities	n/a	0.16	n/a	n/a	n/a	n/a	n/a	n/a	n/a
55.10 Hotels and similar accommodation	0.02	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01
55.20 Holiday and other short-stay accommodation	0.01	0.01	0.01	0.00	0.01	n/a	0.02	n/a	n/a
55.90 Other accommodation	0.00	0.00	0.00	0.00	0.00	n/a	0.00	n/a	n/a
56.10 Restaurants and mobile food service activities	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01
56.21 Event catering activities	0.04	0.05	0.05	0.00	0.04	0.04	0.04	0.04	0.05
56.29 Other food service activities	0.00	0.00	0.00	0.01	n/a	0.00	n/a	0.02	n/a
56.30 Beverage serving activities	0.02	0.00	0.00	0.01	n/a	0.07	n/a	0.06	n/a
58.11 Book publishing	0.09	0.11	0.10	0.09	0.10	0.10	0.09	0.09	0.10
58.12 Publishing of directories and mailing lists	0.00	n/a	n/a	0.00	n/a	n/a	n/a	n/a	n/a
58.13 Publishing of newspapers	0.04	0.09	n/a	0.05	0.07	0.09	0.08	0.10	0.08
58.14 Publishing of journals and periodicals	0.10	0.10	0.19	0.17	0.21	0.19	0.21	0.20	0.19
58.19 Other publishing activities	0.16	n/a	0.18	0.15	n/a	n/a	n/a	n/a	n/a
58.21 Publishing of computer games	n/a	n/a	n/a	n/a	n/a	0.18	0.27	0.30	0.20
58.29 Other software publishing	n/a	n/a	n/a	n/a	n/a	0.31	0.30	0.36	0.35
59.11 Motion picture, video and television programme production activities	0.10	0.10	0.06	0.05	n/a	0.19	0.21	0.18	0.16
59.13 Motion picture, video and television programme distribution activities	0.13	0.17	0.14	0.14	0.15	n/a	n/a	n/a	n/a
59.14 Motion picture projection activities	0.00	0.02	0.03	0.04	0.00	0.00	0.00	0.03	0.03

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
59.20 Sound recording and music publishing activities	0.55	0.49	0.43	0.48	0.38	n/a	n/a	n/a	n/a
60.10 Radio broadcasting	0.01	0.01	0.01	0.01	0.03	0.02	0.02	0.01	0.02
60.20 Television programming and broadcasting activities	0.02	0.04	0.03	0.03	0.06	0.05	0.04	0.07	0.05
61.10 Wired telecommunications activities	0.07	0.06	0.07	0.05	0.06	0.06	0.08	0.07	0.08
61.20 Wireless telecommunications activities	0.10	0.06	0.06	0.07	0.10	0.05	0.04	0.07	0.08
61.30 Satellite telecommunications activities	0.00	0.04	0.00	0.00	n/a	0.26	0.26	n/a	n/a
61.90 Other telecommunications activities	0.15	0.13	0.11	0.12	n/a	0.18	0.17	n/a	n/a
62.01 Computer programming activities	0.20	0.21	0.21	0.22	0.20	0.20	0.23	0.24	0.24
62.02 Computer consultancy activities	0.12	0.11	0.17	0.23	0.19	0.30	0.31	0.35	0.36
62.03 Computer facilities management activities	0.27	0.27	0.16	0.18	0.24	0.22	0.21	0.22	0.20
62.09 Other information technology and computer service activities	0.13	0.12	0.13	0.15	0.16	0.19	0.19	0.24	0.25
63.11 Data processing, hosting and related activities	0.16	n/a	0.25	n/a	0.42	0.42	0.45	0.53	0.54
63.12 Web portals	n/a	n/a	0.13	n/a	0.35	0.34	0.37	0.40	0.38
63.91 News agency activities	0.22	0.21	0.26	0.42	0.63	0.61	0.58	0.63	0.58
63.99 Other information service activities n.e.c.	0.30	0.25	0.27	0.09	0.34	0.40	0.38	0.52	0.44
64.11 Central banking	n/a	n/a	n/a	0.04	0.07	0.08	0.08	0.08	0.05
64.19 Other monetary intermediation	n/a	n/a	n/a	0.04	0.07	0.08	0.08	0.08	0.05
64.20 Activities of holding companies	0.15	0.06	0.03	n/a	n/a	n/a	n/a	n/a	n/a
64.91 Financial leasing	0.06	0.07	0.07	0.03	0.02	0.06	0.02	n/a	0.01
64.92 Other credit granting	0.02	0.02	0.01	0.03	0.03	0.01	0.03	n/a	0.01
64.99 Other financial service activities, except insurance and pension funding n.e.c.	0.03	0.06	0.10	0.10	0.36	0.31	0.32	0.34	0.29
66.11 Administration of financial markets	n/a	n/a	0.09	0.16	0.23	n/a	0.26	n/a	0.06
66.12 Security and commodity contracts brokerage	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.00	0.01
66.19 Other activities auxiliary to financial services, except insurance and pension funding	n/a	n/a	0.02	0.02	0.03	n/a	0.04	n/a	0.06

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
66.22 Activities of insurance agents and brokers	0.02	0.00	0.02	0.07	0.02	0.04	0.05	0.05	0.04
66.30 Fund management activities	n/a	0.06	0.00	0.00	n/a	0.00	0.00	n/a	n/a
68.10 Buying and selling of own real estate	0.01	0.03	0.02	0.01	0.02	0.01	0.01	0.02	0.02
68.20 Renting and operating of own or leased real estate	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02
68.31 Real estate agencies	0.06	0.03	0.05	0.09	0.08	0.12	0.05	0.03	0.06
68.32 Management of real estate on a fee or contract basis	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
69.10 Legal activities	0.36	0.34	0.29	0.31	0.28	0.31	0.29	0.27	0.29
69.20 Accounting, bookkeeping and auditing activities; tax consultancy	0.17	0.15	0.20	0.17	0.20	0.20	0.25	0.29	0.28
70.10 Activities of head offices	n/a	0.00	n/a	0.04	n/a	0.05	0.07	0.06	0.05
70.21 Public relations and communication activities	n/a	n/a	n/a	0.34	n/a	0.07	0.21	0.17	0.10
70.22 Business and other management consultancy activities	n/a	n/a	0.19	0.19	0.20	0.20	0.23	0.25	0.25
71.11 Architectural activities	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.06	0.11
71.12 Engineering activities and related technical consultancy	0.15	0.13	0.13	0.11	0.11	0.14	0.15	0.18	0.16
71.20 Technical testing and analysis	0.14	0.12	0.15	0.13	0.13	0.13	0.14	0.13	0.12
72.11 Research and experimental development on biotechnology	0.08	0.22	n/a	n/a	n/a	0.38	0.14	0.21	0.33
72.19 Other research and experimental development on natural sciences and engineering	0.26	0.18	n/a	n/a	n/a	0.30	0.34	0.34	0.37
72.20 Research and experimental development on social sciences and humanities	0.00	n/a	0.32	0.10	0.00	0.55	0.41	0.38	0.47
73.11 Advertising agencies	0.16	0.18	0.15	0.18	0.18	0.17	0.20	0.22	0.21
73.12 Media representation	0.11	0.22	0.24	0.17	0.13	0.15	0.15	0.16	0.19
73.20 Market research and public opinion polling	0.25	0.34	0.31	0.26	0.34	0.37	0.35	0.37	0.38
74.10 Specialised design activities	0.12	0.13	0.13	0.19	0.14	0.16	0.24	0.24	0.22
74.20 Photographic activities	0.07	0.08	0.07	n/a	0.14	0.24	0.11	0.14	0.12
74.30 Translation and interpretation activities	0.15	0.20	0.16	n/a	0.46	0.45	0.48	0.44	0.41

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
74.90 Other professional, scientific and technical activities n.e.c.	0.11	0.11	0.14	0.16	0.08	0.18	0.26	0.24	0.25
75.00 Veterinary activities	0.00	n/a	0.00	0.00	0.00	0.04	0.00	0.03	0.00
77.11 Renting and leasing of cars and light motor vehicles	0.05	0.02	0.05	0.07	0.05	0.06	0.03	0.03	0.03
77.12 Renting and leasing of trucks	n/a	0.10	0.06	0.03	0.05	0.07	0.07	0.07	0.07
77.22 Renting of video tapes and disks	0.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
77.32 Renting and leasing of construction and civil engineering machinery and equipment	n/a	0.15	0.14	0.12	0.11	0.16	0.19	0.15	0.12
77.33 Renting and leasing of office machinery and equipment (including computers)	n/a	n/a	n/a	n/a	0.26	0.00	0.00	0.20	n/a
77.39 Renting and leasing of other machinery, equipment and tangible goods n.e.c.	n/a	n/a	0.10	0.08	0.10	0.12	0.11	0.13	0.13
77.40 Leasing of intellectual property and similar products, except copyrighted works	n/a	n/a	n/a	0.18	0.10	0.13	0.09	0.05	0.06
78.10 Activities of employment placement agencies	0.19	0.20	0.23	0.22	0.16	0.25	0.18	0.16	0.15
78.20 Temporary employment agency activities	0.12	0.14	0.12	0.11	0.09	0.10	0.13	0.13	0.10
78.30 Other human resources provision	0.08	0.07	0.06	0.06	0.11	0.08	0.10	0.07	0.07
79.11 Travel agency activities	0.04	0.10	0.03	0.03	0.02	0.01	0.00	0.04	0.04
79.12 Tour operator activities	0.08	0.09	0.04	0.02	0.04	0.03	0.04	0.04	0.05
79.90 Other reservation service and related activities	0.06	0.04	0.02	0.02	0.04	0.04	0.10	0.12	0.10
80.10 Private security activities	0.01	n/a	0.01	0.05	0.02	0.01	0.01	0.01	0.02
80.20 Security systems service activities	n/a	0.01	n/a	n/a	0.02	n/a	0.01	0.06	0.02
80.30 Investigation activities	n/a	n/a	n/a	n/a	0.00	n/a	0.00	0.04	0.00
81.10 Combined facilities support activities	0.00	0.00	0.01	0.00	0.00	n/a	0.00	0.00	0.18
81.21 General cleaning of buildings	0.01	0.01	0.00	0.01	0.03	0.01	0.01	0.01	0.01
81.22 Other building and industrial cleaning activities	0.01	0.01	0.01	0.05	0.02	0.01	0.01	0.02	0.01
81.29 Other cleaning activities	0.02	0.02	0.01	0.01	0.02	0.00	0.00	0.03	0.03

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
81.30 Landscape service activities	0.02	0.01	0.01	0.01	0.04	n/a	0.04	0.03	0.04
82.11 Combined office administrative service activities	n/a	0.11	n/a	n/a	0.15	0.37	0.21	0.16	0.20
82.19 Photocopying, document preparation and other specialised office support activities	n/a	n/a	n/a	n/a	0.30	0.30	0.22	0.21	0.11
82.20 Activities of call centres	n/a	0.08	n/a	0.25	0.26	0.26	0.21	0.16	0.24
82.30 Organisation of conventions and trade shows	0.08	0.09	0.19	n/a	0.08	0.05	0.09	0.12	0.10
82.91 Activities of collection agencies and credit bureaus	0.05	0.07	0.08	0.09	0.16	0.19	0.11	0.12	0.12
82.92 Packaging activities	0.23	0.22	0.20	0.34	0.37	0.40	0.40	0.46	0.40
82.99 Other business support service activities n.e.c.	0.06	0.14	0.12	0.16	0.14	0.12	0.13	0.15	0.28
85.10 Pre-primary education	n/a	n/a	0.00	0.02	0.00	n/a	0.04	0.00	0.03
85.20 Primary education	n/a	n/a	0.00	n/a	0.00	0.01	0.02	0.02	0.01
85.31 General secondary education	0.00	0.00	0.00	0.00	n/a	n/a	n/a	0.00	n/a
85.32 Technical and vocational secondary education	0.03	0.02	0.00	n/a	n/a	n/a	n/a	0.00	n/a
85.41 Post-secondary non-tertiary education	n/a	n/a	n/a	n/a	n/a	n/a	0.02	0.00	0.00
85.51 Sports and recreation education	n/a	n/a	n/a	n/a	n/a	0.00	0.00	n/a	n/a
85.53 Driving school activities	n/a	n/a	n/a	0.00	n/a	0.00	0.33	0.00	0.00
85.59 Other education n.e.c.	0.02	0.02	0.02	0.05	0.03	0.03	0.03	0.04	0.04
85.60 Educational support activities	0.00	0.27	0.00	n/a	n/a	n/a	0.13	0.10	0.03
86.10 Hospital activities	0.01	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.02
86.21 General medical practice activities	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.01	0.01
86.22 Specialist medical practice activities	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.02
86.23 Dental practice activities	0.00	0.00	0.00	0.01	0.02	0.00	0.02	0.04	0.00
86.90 Other human health activities	0.01	0.01	0.01	0.04	0.03	0.02	0.03	0.04	0.05
87.10 Residential nursing care activities	0.00	0.00	n/a	n/a	n/a	n/a	0.00	n/a	n/a
87.20 Residential care activities for mental retardation, mental health and substance abuse	0.00	0.00	n/a	n/a	n/a	0.00	n/a	n/a	n/a

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
87.30 Residential care activities for the elderly and disabled	0.00	0.00	n/a	0.00	0.00	n/a	n/a	0.00	0.11
87.90 Other residential care activities	0.00	0.00	0.00	0.38	0.00	0.00	0.07	0.00	n/a
88.10 Social work activities without accommodation for the elderly and disabled	n/a	n/a	n/a	0.00	0.00	0.20	0.16	0.11	0.00
88.91 Child day-care activities	n/a	n/a	n/a	n/a	0.00	n/a	0.00	0.00	n/a
90.01 Performing arts	0.35	n/a	n/a	0.11	n/a	n/a	0.08	0.13	0.21
90.02 Support activities to performing arts	n/a	0.06	0.15	n/a	n/a	n/a	n/a	n/a	n/a
90.04 Operation of arts facilities	n/a	0.00	n/a	n/a	0.00	0.08	0.00	n/a	n/a
91.01 Library and archives activities	n/a	n/a	n/a	0.06	0.08	0.07	0.07	n/a	n/a
91.03 Operation of historical sites and buildings and similar visitor attractions	0.08	0.09	0.08	0.07	0.04	0.05	0.01	0.02	0.00
92.00 Gambling and betting activities	0.04	0.06	0.01	0.03	0.01	0.02	0.02	0.03	0.04
93.11 Operation of sports facilities	n/a	0.01	0.00	0.00	0.01	0.00	0.01	0.03	0.01
93.12 Activities of sport clubs	0.00	0.00	0.00	0.00	0.00	n/a	0.05	0.02	0.04
93.13 Fitness facilities	n/a	n/a	0.00	n/a	0.00	n/a	n/a	0.00	0.00
93.19 Other sports activities	0.12	n/a	0.00	n/a	0.00	0.00	n/a	0.05	0.08
93.21 Activities of amusement parks and theme parks	n/a	0.00	n/a	n/a	n/a	0.00	0.00	n/a	n/a
93.29 Other amusement and recreation activities	n/a	0.02	n/a	n/a	n/a	0.02	0.02	n/a	n/a
94.99 Activities of other membership organisations n.e.c.	0.00	0.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a
95.11 Repair of computers and peripheral equipment	0.09	0.12	0.15	0.39	0.33	0.41	0.25	0.24	0.26
95.12 Repair of communication equipment	0.31	0.26	0.27	0.33	0.36	0.33	0.31	0.31	0.22
95.21 Repair of consumer electronics	0.00	n/a	0.00	0.00	0.22	0.27	0.41	0.13	0.14
95.22 Repair of household appliances and home and garden equipment	n/a	0.00	0.00	0.04	0.00	0.00	0.00	n/a	0.18
95.24 Repair of furniture and home furnishings	0.17	0.41	0.29	n/a	n/a	n/a	n/a	n/a	n/a
95.29 Repair of other personal and household goods	0.34	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

PKD	2007	2008	2009	2010	2011	2012	2013	2014	2015
96.01 Washing and (dry-)cleaning of textile and fur products	0.08	0.08	0.09	0.09	0.09	0.08	0.09	0.11	0.11
96.02 Hairdressing and other beauty treatment	n/a	0.00	0.00	0.01	0.01	0.01	n/a	n/a	n/a
96.03 Funeral and related activities	0.00	0.00	0.00	0.00	0.01	0.01	0.01	n/a	0.01
96.04 Physical well-being activities	n/a	0.03	0.10	0.03	0.03	0.03	0.00	0.00	n/a
96.09 Other personal service activities n.e.c.	0.08	0.07	0.05	0.03	0.04	0.03	0.00	0.03	0.04

n/a – data not available.

Source: Based on PontInfo Gospodarka database (accessed 20.05.2018).

Appendix 6

Ranking of activities during the economic crisis

No.	PKD	Impact	No.	PKD	Impact	No.	PKD	Impact
1	24.1	0.94	114	33.12	0.82	227	27.51	0.80
2	73.12	0.90	115	25.11	0.82	228	43.32	0.80
3	10.42	0.87	116	20.3	0.82	229	20.52	0.80
4	24.42	0.86	117	46.71	0.82	230	25.91	0.80
5	24.34	0.86	118	13.96	0.82	231	49.32	0.80
6	24.44	0.86	119	73.11	0.82	232	33.15	0.80
7	20.6	0.86	120	22.19	0.82	233	18.13	0.80
8	28.91	0.85	121	18.11	0.82	234	46.39	0.80
9	28.49	0.85	122	22.21	0.82	235	21.2	0.80
10	13.2	0.85	123	10.51	0.82	236	96.09	0.80
11	23.62	0.85	124	47.77	0.82	237	96.01	0.80
12	30.12	0.85	125	50.2	0.82	238	43.99	0.80
13	16.21	0.85	126	28.29	0.82	239	41.2	0.80
14	47.79	0.85	127	25.21	0.82	240	35.22	0.80
15	49.2	0.85	128	55.1	0.82	241	47.78	0.80
16	20.16	0.85	129	28.14	0.82	242	46.61	0.80
17	23.41	0.85	130	66.12	0.82	243	46.41	0.79
18	23.32	0.85	131	20.14	0.82	244	47.21	0.79
19	46.72	0.84	132	12.0	0.82	245	46.46	0.79
20	33.11	0.84	133	45.11	0.82	246	10.84	0.79
21	10.72	0.84	134	46.36	0.82	247	46.21	0.79
22	29.2	0.84	135	11.07	0.82	248	81.29	0.79
23	64.92	0.84	136	10.81	0.82	249	46.19	0.79
24	23.31	0.84	137	49.31	0.82	250	46.63	0.79
25	24.53	0.84	138	47.54	0.82	251	27.52	0.79
26	46.34	0.84	139	74.9	0.82	252	71.11	0.79
27	24.43	0.84	140	28.25	0.82	253	42.13	0.79
28	23.99	0.84	141	10.12	0.82	254	47.59	0.79
29	13.91	0.84	142	20.2	0.81	255	42.91	0.79
30	14.13	0.84	143	21.1	0.81	256	30.2	0.79
31	74.2	0.84	144	52.23	0.81	257	58.11	0.79
32	46.44	0.84	145	47.25	0.81	258	79.9	0.79
33	23.64	0.84	146	30.92	0.81	259	56.21	0.79
34	14.14	0.84	147	01.11	0.81	260	26.2	0.79
35	28.41	0.84	148	01.46	0.81	261	20.42	0.79

No.	PKD	Impact	No.	PKD	Impact	No.	PKD	Impact
36	01.61	0.84	149	46.17	0.81	262	47.71	0.79
37	20.15	0.84	150	45.32	0.81	263	81.22	0.78
38	16.1	0.84	151	25.99	0.81	264	42.21	0.78
39	01.13	0.84	152	61.2	0.81	265	69.1	0.78
40	16.29	0.84	153	64.91	0.81	266	73.2	0.78
41	46.77	0.84	154	28.11	0.81	267	71.2	0.78
42	17.22	0.83	155	46.33	0.81	268	62.01	0.78
43	15.2	0.83	156	01.3	0.81	269	47.41	0.78
44	13.99	0.83	157	27.32	0.81	270	80.1	0.78
45	23.91	0.83	158	46.75	0.81	271	47.73	0.78
46	10.89	0.83	159	25.62	0.81	272	37.0	0.78
47	23.12	0.83	160	31.09	0.81	273	32.91	0.78
48	30.11	0.83	161	27.12	0.81	274	78.2	0.78
49	28.99	0.83	162	10.73	0.81	275	46.32	0.78
50	28.13	0.83	163	23.7	0.81	276	71.12	0.78
51	28.15	0.83	164	81.21	0.81	277	47.19	0.78
52	23.52	0.83	165	10.83	0.81	278	58.14	0.78
53	46.9	0.83	166	14.31	0.81	279	10.71	0.78
54	10.31	0.83	167	78.1	0.81	280	10.85	0.78
55	60.1	0.83	168	91.03	0.81	281	32.4	0.77
56	14.11	0.83	169	01.5	0.81	282	38.21	0.77
57	11.03	0.83	170	11.05	0.81	283	47.24	0.77
58	13.95	0.83	171	43.12	0.81	284	56.1	0.77
59	01.43	0.83	172	46.66	0.81	285	47.74	0.77
60	27.9	0.83	173	46.42	0.81	286	43.33	0.77
61	46.14	0.83	174	26.3	0.81	287	43.39	0.77
62	28.3	0.83	175	46.13	0.81	288	81.3	0.77
63	46.43	0.83	176	38.32	0.81	289	47.72	0.77
64	01.62	0.83	177	17.21	0.81	290	69.2	0.77
65	23.2	0.83	178	46.37	0.81	291	86.9	0.77
66	13.92	0.83	179	45.31	0.81	292	20.41	0.77
67	25.5	0.83	180	59.14	0.81	293	47.91	0.77
68	46.23	0.83	181	68.32	0.81	294	46.35	0.77
69	46.24	0.83	182	46.73	0.81	295	38.22	0.77
70	23.61	0.83	183	11.06	0.81	296	79.11	0.77
71	47.76	0.83	184	33.13	0.81	297	46.31	0.76
72	01.49	0.83	185	38.31	0.81	298	86.23	0.76
73	33.17	0.83	186	25.92	0.81	299	92.0	0.76
74	25.94	0.83	187	74.3	0.81	300	42.11	0.76
75	31.01	0.83	188	46.74	0.81	301	10.82	0.76

No.	PKD	Impact	No.	PKD	Impact	No.	PKD	Impact
76	28.21	0.83	189	28.92	0.81	302	62.09	0.76
77	23.42	0.83	190	01.41	0.81	303	43.34	0.76
78	10.39	0.82	191	20.11	0.81	304	47.75	0.75
79	26.4	0.82	192	81.1	0.81	305	46.52	0.75
80	52.24	0.82	193	32.99	0.81	306	43.31	0.75
81	14.19	0.82	194	25.61	0.81	307	68.1	0.75
82	22.11	0.82	195	79.12	0.81	308	43.13	0.75
83	82.91	0.82	196	46.49	0.81	309	10.41	0.75
84	24.51	0.82	197	33.14	0.81	310	61.1	0.75
85	25.93	0.82	198	08.93	0.81	311	43.91	0.74
86	16.23	0.82	199	02.4	0.81	312	47.64	0.74
87	23.13	0.82	200	11.01	0.81	313	62.03	0.74
88	29.1	0.82	201	10.52	0.81	314	46.22	0.73
89	45.19	0.82	202	25.12	0.81	315	46.38	0.73
90	18.12	0.82	203	30.3	0.81	316	20.13	0.73
91	28.93	0.82	204	46.45	0.80	317	43.11	0.72
92	47.3	0.82	205	46.62	0.80	318	62.02	0.72
93	47.99	0.82	206	22.29	0.80	319	08.99	0.72
94	22.23	0.82	207	86.22	0.80	320	82.92	0.72
95	41.1	0.82	208	23.51	0.80	321	46.48	0.71
96	08.12	0.82	209	20.59	0.80	322	86.1	0.71
97	31.02	0.82	210	10.86	0.80	323	47.53	0.71
98	47.22	0.82	211	43.22	0.80	324	52.1	0.71
99	52.29	0.82	212	46.69	0.80	325	35.11	0.71
100	10.13	0.82	213	32.5	0.80	326	31.03	0.70
101	68.31	0.82	214	46.18	0.80	327	60.2	0.68
102	17.23	0.82	215	27.11	0.80	328	86.21	0.68
103	46.51	0.82	216	56.29	0.80	329	82.99	0.68
104	10.11	0.82	217	22.22	0.80	330	42.12	0.67
105	33.2	0.82	218	23.63	0.80	331	35.14	0.66
106	56.3	0.82	219	25.29	0.80	332	95.21	0.65
107	46.76	0.82	220	47.11	0.80	333	23.11	0.63
108	28.12	0.82	221	10.2	0.80	334	66.22	0.61
109	28.22	0.82	222	96.03	0.80	335	46.11	0.59
110	14.12	0.82	223	46.47	0.80	336	64.99	0.31
111	10.32	0.82	224	01.47	0.80	337	28.96	0.30
112	08.11	0.82	225	49.39	0.80	338	01.19	0.26
113	68.2	0.82	226					

Source: Based on the PontInfo Gospodarka database (accessed 22.06.2016).

Appendix 7

Ranking of activities during the time of prosperity

No.	PKD	Impact	No.	PKD	Impact	No.	PKD	Impact
1	24.1	0.97	114	01.49	0.91	227	46.32	0.90
2	46.9	0.95	115	47.3	0.91	228	23.63	0.90
3	73.12	0.94	116	24.42	0.91	229	22.22	0.90
4	28.11	0.94	117	13.92	0.91	230	13.95	0.90
5	81.1	0.94	118	14.12	0.91	231	47.71	0.90
6	43.12	0.94	119	11.06	0.91	232	20.3	0.89
7	20.16	0.93	120	23.51	0.91	233	37.0	0.89
8	74.9	0.93	121	31.01	0.91	234	62.03	0.89
9	47.21	0.93	122	47.25	0.91	235	66.12	0.89
10	23.32	0.93	123	10.86	0.91	236	20.15	0.89
11	23.42	0.93	124	20.11	0.91	237	30.3	0.89
12	56.3	0.93	125	25.5	0.91	238	46.69	0.89
13	33.11	0.93	126	16.29	0.91	239	27.11	0.89
14	47.78	0.93	127	01.46	0.91	240	24.53	0.89
15	68.31	0.93	128	55.1	0.91	241	01.41	0.89
16	79.9	0.93	129	28.15	0.91	242	47.73	0.89
17	21.1	0.93	130	58.11	0.91	243	23.64	0.89
18	29.1	0.93	131	10.51	0.91	244	74.3	0.89
19	23.62	0.93	132	25.94	0.91	245	20.52	0.89
20	14.11	0.93	133	56.29	0.91	246	01.47	0.89
21	14.13	0.93	134	01.61	0.91	247	80.1	0.89
22	68.2	0.93	135	33.2	0.91	248	20.42	0.89
23	47.99	0.93	136	23.91	0.91	249	73.2	0.89
24	28.91	0.93	137	68.32	0.91	250	79.12	0.89
25	47.54	0.93	138	46.36	0.91	251	25.91	0.89
26	47.24	0.93	139	26.3	0.91	252	81.3	0.89
27	46.34	0.93	140	10.31	0.91	253	38.32	0.89
28	10.89	0.93	141	28.21	0.91	254	69.1	0.89
29	46.72	0.92	142	23.99	0.91	255	58.14	0.89
30	43.32	0.92	143	13.96	0.91	256	25.62	0.89
31	52.24	0.92	144	01.13	0.91	257	43.31	0.89
32	13.2	0.92	145	42.91	0.91	258	32.99	0.89
33	14.19	0.92	146	27.9	0.91	259	10.81	0.89
34	46.66	0.92	147	01.62	0.91	260	25.61	0.89
35	74.2	0.92	148	23.2	0.91	261	18.13	0.89

No.	PKD	Impact	No.	PKD	Impact	No.	PKD	Impact
36	14.14	0.92	149	20.6	0.91	262	38.31	0.89
37	16.21	0.92	150	46.71	0.91	263	47.74	0.89
38	81.21	0.92	151	45.19	0.91	264	35.22	0.89
39	46.49	0.92	152	25.93	0.91	265	46.63	0.89
40	46.43	0.92	153	23.13	0.91	266	43.99	0.89
41	23.41	0.92	154	28.3	0.91	267	38.22	0.89
42	60.1	0.92	155	22.11	0.91	268	71.2	0.89
43	47.41	0.92	156	10.52	0.91	269	95.21	0.89
44	71.11	0.92	157	16.1	0.91	270	10.71	0.89
45	46.41	0.92	158	64.91	0.91	271	47.72	0.89
46	10.72	0.92	159	46.24	0.91	272	20.14	0.89
47	28.41	0.92	160	42.21	0.91	273	46.48	0.89
48	16.23	0.92	161	96.09	0.91	274	32.91	0.89
49	46.17	0.92	162	21.2	0.91	275	47.11	0.89
50	28.49	0.92	163	59.14	0.91	276	01.5	0.89
51	01.43	0.92	164	22.23	0.91	277	46.75	0.88
52	46.39	0.92	165	47.59	0.91	278	46.61	0.88
53	23.7	0.92	166	17.23	0.90	279	56.1	0.88
54	23.61	0.92	167	33.14	0.90	280	30.2	0.88
55	23.12	0.92	168	10.73	0.90	281	47.75	0.88
56	28.29	0.92	169	28.93	0.90	282	20.59	0.88
57	47.79	0.92	170	28.14	0.90	283	32.4	0.88
58	13.91	0.92	171	46.44	0.90	284	38.21	0.88
59	10.85	0.92	172	41.2	0.90	285	62.01	0.88
60	28.99	0.92	173	28.13	0.90	286	10.82	0.88
61	24.44	0.92	174	50.2	0.90	287	43.33	0.88
62	27.51	0.92	175	10.13	0.90	288	46.21	0.88
63	45.11	0.92	176	11.01	0.90	289	86.23	0.88
64	46.73	0.92	177	43.34	0.90	290	69.2	0.88
65	18.11	0.92	178	20.2	0.90	291	71.12	0.88
66	18.12	0.92	179	43.39	0.90	292	27.52	0.88
67	29.2	0.92	180	25.12	0.90	293	46.38	0.87
68	30.92	0.92	181	46.47	0.90	294	62.02	0.87
69	49.32	0.92	182	43.22	0.90	295	86.9	0.87
70	23.31	0.92	183	22.19	0.90	296	81.22	0.87
71	31.02	0.92	184	08.12	0.90	297	61.2	0.87
72	10.42	0.92	185	25.92	0.90	298	46.22	0.87
73	46.33	0.92	186	46.74	0.90	299	46.35	0.87
74	12.0	0.92	187	10.2	0.90	300	79.11	0.87
75	46.42	0.92	188	25.99	0.90	301	47.64	0.87

No.	PKD	Impact	No.	PKD	Impact	No.	PKD	Impact
76	49.39	0.92	189	22.21	0.90	302	10.83	0.87
77	47.22	0.92	190	86.22	0.90	303	42.13	0.87
78	33.17	0.92	191	10.41	0.90	304	47.19	0.87
79	92.0	0.92	192	02.4	0.90	305	62.09	0.87
80	47.76	0.92	193	27.12	0.90	306	20.13	0.87
81	24.34	0.92	194	96.01	0.90	307	46.51	0.87
82	17.22	0.91	195	46.45	0.90	308	56.21	0.86
83	28.12	0.91	196	26.4	0.90	309	43.11	0.86
84	15.2	0.91	197	10.12	0.90	310	46.31	0.86
85	23.52	0.91	198	46.19	0.90	311	78.3	0.86
86	81.29	0.91	199	25.11	0.90	312	64.92	0.86
87	13.99	0.91	200	08.11	0.90	313	47.53	0.86
88	30.12	0.91	201	46.14	0.90	314	82.92	0.86
89	61.1	0.91	202	26.2	0.90	315	23.11	0.86
90	45.32	0.91	203	46.77	0.90	316	43.13	0.85
91	73.11	0.91	204	08.93	0.90	317	86.21	0.85
92	11.05	0.91	205	52.29	0.90	318	01.19	0.85
93	33.13	0.91	206	47.77	0.90	319	52.1	0.84
94	01.3	0.91	207	25.21	0.90	320	60.2	0.84
95	24.51	0.91	208	17.21	0.90	321	47.91	0.84
96	24.43	0.91	209	42.11	0.90	322	27.32	0.84
97	10.39	0.91	210	49.31	0.90	323	35.11	0.83
98	11.07	0.91	211	28.92	0.90	324	28.96	0.83
99	78.1	0.91	212	82.91	0.90	325	86.1	0.82
100	30.11	0.91	213	96.03	0.90	326	91.03	0.82
101	28.22	0.91	214	46.23	0.90	327	66.22	0.82
102	46.13	0.91	215	45.31	0.90	328	08.99	0.80
103	11.03	0.91	216	52.23	0.90	329	43.91	0.80
104	41.1	0.91	217	20.41	0.90	330	42.12	0.80
105	14.31	0.91	218	46.18	0.90	331	31.03	0.78
106	31.09	0.91	219	46.46	0.90	332	68.1	0.77
107	49.2	0.91	220	25.29	0.90	333	78.2	0.77
108	28.25	0.91	221	32.5	0.90	334	64.99	0.75
109	46.76	0.91	222	33.15	0.90	335	82.99	0.73
110	46.37	0.91	223	33.12	0.90	336	46.52	0.71
111	10.11	0.91	224	10.84	0.90	337	46.11	0.59
112	46.62	0.91	225	01.11	0.90	338	35.14	0.43
113	10.32	0.91	226	22.29	0.90			

Source: Based on the PontInfo Gospodarka database (accessed 22.06.2016).

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List of Tables

List of Figures

List of Charts