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CORPORATE BANKRUPTCY, A SPATIAL AND TEMPORAL PERSPECTIVE – THE CASE OF POLAND

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Abstract. Progressive changes in many areas of the business environment and internal processes in business entities are increasingly the cause of crises occurring in them, in extreme cases resulting in the need to declare bankruptcy. Bankruptcies can be considered, on the one hand, as a manifestation of maladaptation to the requirements and transformations of the market, but more and more often they become a derivative of phenomena over which entrepreneurs have absolutely no influence. The paper attempts to analyze the scale of business bankruptcies in Poland in 2009-2021, which was based on data from the Central Statistical Office and the Central Economic Information Center. Exploratory research was carried out on a time sample of 12,960 entities for the years 2009-2021, which declared bankruptcy in the analyzed period and represented all enterprises of the Polish market from the time period adopted for the research. The analyzed sample took into account the number of bankruptcies of enterprises falling on particular years. The purpose of the article is to analyze the scale of the bankruptcy phenomenon in Poland over the period 2009-2021 and to try to identify the existing dependencies.

Keywords: bankruptcy; bankruptcy risk; trends in the phenomenon of bankruptcy

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JEL Classifications: G32, G33, F37

1. Introduction

The literature of the subject points out that the phenomenon of business bankruptcy is an extremely interesting research problem due to the fact that it is perceived as a shocking event, somewhat scandalous, and certainly as an event that puts the company's management and owners in an unfavorable light, which leads to the dishonorable death of the company associated with leaving unpaid liabilities (Nowak, 2008). This phenomenon is particularly relevant to SMEs companies, which play a huge role in job creation, sustainable economic development and equitable income distribution in the economy (Fatoki, 2014; Ighoshemu, Ogidiagba, 2022). In OECD countries, SMEs account for up to 99% of all entities, and are therefore the dominant form of business, while accounting for up to 70% of jobs and generating between 50 and 60% of value added in the economy (OECD, 2017). Nevertheless, in economic practice, business bankruptcies are treated as a natural phenomenon, inscribed in the market changes taking place in the business environment, which are derived from competition (Ropęga, 2010), the industrial and technological revolution (Płonka et al., 2020), or, finally, unfair market practices (Ostrowska-Dankiewicz, 2019), the emergence of payment congestion (Zimon, 2020), which can appear as a result of such unexpected events as, for example, a pandemic (Dankiewicz et al., 2021). The effect of the aforementioned events is the liquidation of unprofitable units, thereby creating space for the activities of those entities that make more efficient use of limited resources (Dankiewicz, 2020; Grega, Nečas, 2022).

The purpose of the study is to assess the scale of the bankruptcy phenomenon in Poland in 2009-2021 and to characterize it in various cross sections.

2. Literature review

The literature points out that well-functioning businesses are an essential element in creating economic growth, social welfare and the efficiency of the banking sector, if only because a significant percentage of the demand for money is attributed to businesses, and banks earn money from lending (Lin & Mabe, 2018; Somogyi, Nagy, 2022). However, excessive indebtedness can increase the risk of financial difficulties arising in companies, especially as a result of inadequate debt management; nevertheless, it is not possible to completely abandon indebtedness, as debt can act as a tax shield in certain cases (Salubi, 2016). The failure of companies and their consequent collapse is a very costly phenomenon for the economy since the failure of a company affects all its stakeholders. A special role in this regard is attributed to companies in the construction industry, which in a sense are the foundation of economic growth by connecting other industries through the construction of roads or buildings, among other things (Tserng et al., 2014). On the other hand, corporations that are in a bad financial situation and at risk of bankruptcy can have a negative impact on shareholders, customers or institutional lenders such as banks (Bandyopadhyay, 2006), which is why it is crucial to skillfully forecast corporate bankruptcy (Memic, 2015).

Some of the earliest works on corporate bankruptcy and its forecasting were those of Beaver (1966), which emphasized the importance of financial ratios as predictors of bankruptcy, Altman (1968), in which the author bridges the gap between individual ratio analysis and statistical methods for predicting a company's financial health by using financial ratios as variables to forecast bankruptcy using the z-score, and Ohlson (1980), who uses a probabilistic model instead of a ratio. It is now pointed out that there are basically countless variables that can be used in bankruptcy research. Some studies suggest that such work should combine market data with data from financial statements (Charalambakis, 2015; Tinoco & Wilson, 2013). However, the most commonly used metrics in past studies include profitability, liquidity, asset quality (Lee & Sung 2013), leverage ratio (Lyandres & Zhdanov 2013), profit before taxes/long-term liabilities, current assets/total liabilities (Charalambakis 2016), or market capitalization (Tinoco & Wilson 2013). Noting that most studies focus on the use of variables from the micro-environment, the study by Sousa, Braga and Cunha (2022), in addition to microeconomic factors, also focuses on analyzing the relationship between microeconomic and macroeconomic factors and using them in predicting corporate bankruptcy.

Along with bankruptcy forecasting, which is always a topical issue (Horak et al., 2020), one of the main areas of research on corporate bankruptcy is an attempt to identify the entities most at risk of bankruptcy and the factors that have a significant impact on the emergence of financial problems for companies, and therefore to some extent increase their risk of bankruptcy (Dankiewicz & Szymanska, 2020). Studies available in the literature indicate that the entities most affected by bankruptcy risk are the youngest and smallest companies (Aleksanyan & Huiban, 2016), pointing to a significant link between bankruptcy risk and company age (Kücher et al., 2020). The studies also show that one of the symptoms of company bankruptcy can be the publication of financial statements late (Lukason & Camacho-Miñano, 2019). Some scholars see specific reasons for corporate bankruptcy in the occurrence of financial crises (Mackevičius et al., 2018).

However, there is no doubt that poor financial risk management and poor debt management (Kristanti et al., 2019) are unprecedented causes of corporate bankruptcy, as well as maintaining liquidity, profitability and leverage ratios at inadequate levels (Lukason & Camacho-Miñano, 2019; Zahariev et al., 2020).

This is corroborated by studies by Truong & Nguyen (2022) and Andersson & Kihlberg (2022), which show that a company's risk of bankruptcy has a positive correlation with the following variables: return on assets; current liquidity ratio; and a negative relationship (inversely correlated) with company size, leverage, capital intensity and the size of the auditing firm auditing the report. Studies on bankruptcy of companies

doing business in Poland show that the scale of bankruptcy is largely determined by macroeconomic variables, such as the level of unemployment, inflation rate, gross profitability of the entity or exchange rates and oil prices (Tokarski & Tokarski, 2018, Jurgilewicz et al., 2022), lack of liquidity, decline in sales revenue, failure to pay debts, poor cooperation with counterparties, poor management, overinvestment (Holda & Strojny, 2019). In addition, it should be noted that the risk of bankruptcy of companies in Poland varies greatly regionally, and also depends on its size and the sector in which it operates (Ptak-Chmielewska, 2018; Pisula, 2020).

3. Research methodology

The assessment of the phenomenon of business bankruptcy in Poland, together with an analysis of the areas and characteristics of its occurrence, was based on historical data from 2009-2021, published by the Central Statistical Office. It should be noted that it is difficult to give the exact number of companies operating in Poland because the CSO data is not adjusted for inactive entities. The number of company bankruptcies from year to year also varies between CSO and CEIC (Central Economic Information Center) statistics. To the number of bankruptcies it would be necessary to add companies that filed for bankruptcy but they were dismissed due to their insufficient assets, and for data after 2016 those that started restructuring proceedings. The analysis was carried out using statistical measures of structure, dynamics and correlation by province, industry and legal form of business. Exploratory research was carried out on a time sample of 12,960 entities for the years 2009-2021, which declared bankruptcy during the analyzed period and represented all companies of the Polish market from the time period adopted for the research. The analyzed sample considering the number of business bankruptcies per year looked as follows: 2009 - 673 entities, 2010 - 691 entities, 2011 - 757 entities, 2012 - 912 entities, 2013 - 1025 entities, 2014 - 937 entities, 2015 - 747 entities, 2016 - 860 entities, 2017 - 942 entities, 2018 - 998 entities, 2019 - 985 entities, 2020 - 1259 entities and 2021 - 2174 entities. In addition, for the years 2009-2019, the data on turnover and employment in the surveyed enterprises were available. On this basis, a cluster analysis of enterprises that declared bankruptcy for the years 2009, 2013 and 2019 was carried out. The main purpose of the cluster analysis is to study the similarity or separateness of objects. As a result of the analysis, objects are divided into classes containing similar objects due to the observed variables (Gatnar & Walesiak, 2004). In this study, a two-stage cluster analysis was used to separate classes of bankrupt entities characterized by similarity in terms of turnover, employment, industry, and legal form of business. The results were compared over time. Two-stage cluster analysis is quite robust to assumptions about the distributions of variables, and allows the quality of clustering to be assessed using the Silhouette measure, while also providing the ability to automatically determine the number of groups.

4. Research results

In 2009-2021, both the number of bankruptcies and the bankruptcy index (the intensity index, which is the quotient of the number of bankruptcies and the number of companies) for Poland showed an upward trend (see Fig. 1).

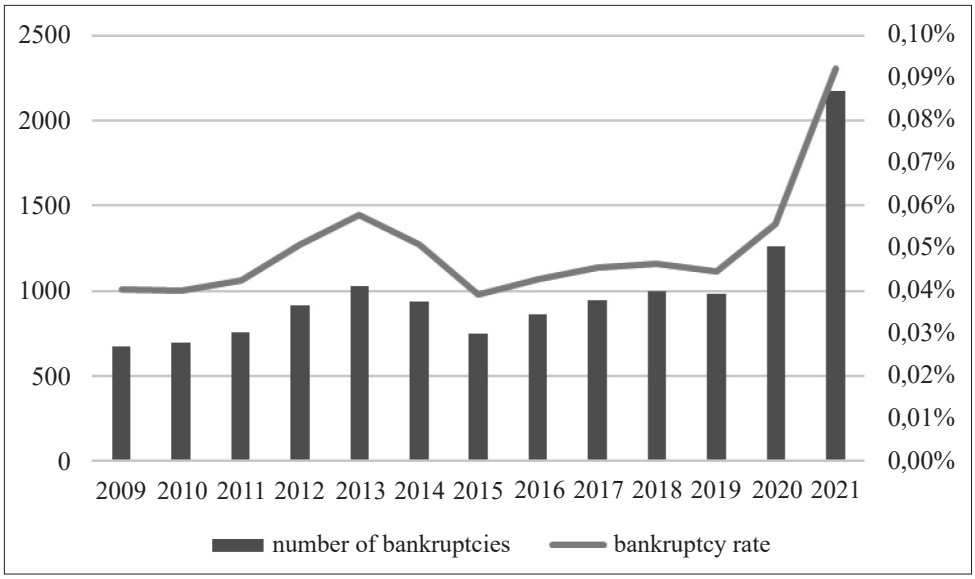

Figure 1. Number of bankruptcies and bankruptcy rate in Poland from 2009 to 2021

Source: own calculations

From 2009 to 2019, the number of bankruptcies fluctuated between 673 and 985 per year. In 2020, the number of bankruptcies exceeded 1,200, and in 2021 it was already 2,2174.

Spatial differentiation of the number of enterprises that declared bankruptcy by province is not straightforward due to the rather strong dispersion of the number of enterprises in the provinces (the coefficient of variation of the number of enterprises amounting to about 70% in the years under study). For this reason, a comparison was made of the bankruptcy intensity index, which is the ratio of the number of enterprises in a given province that went bankrupt to the number of all non-financial enterprises operating in a given province in the year under study. The results of the analysis are shown in Fig.2-3.

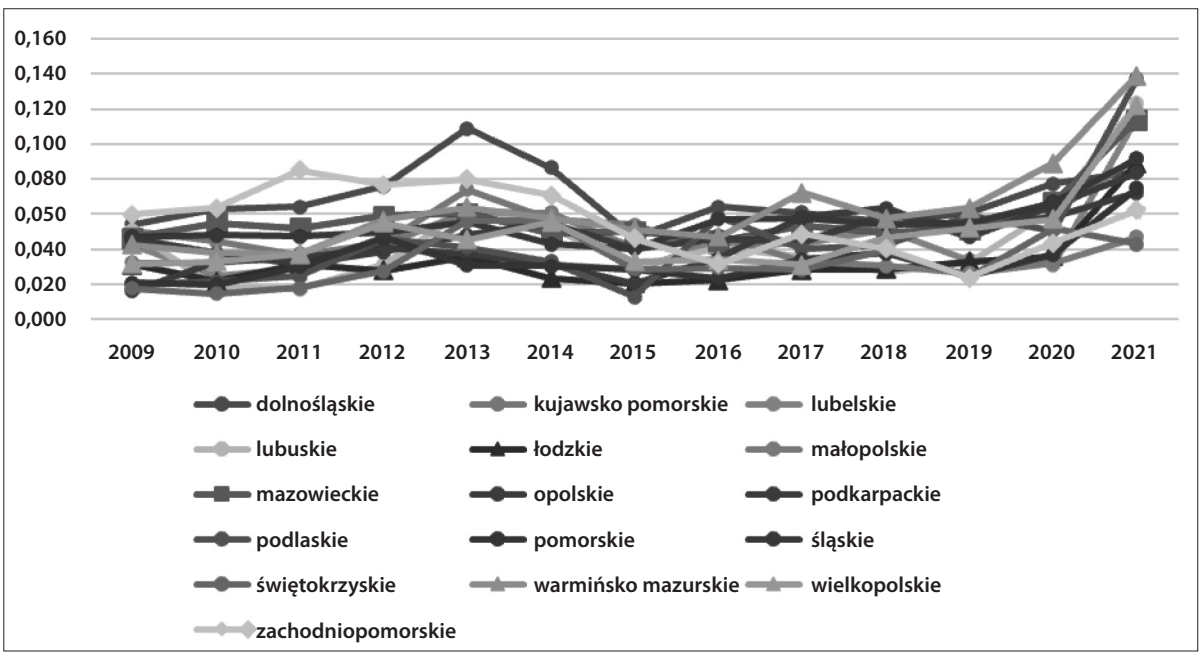

Figure 2. Corporate bankruptcy rate by province in 2009-2021

Source: own calculations

The value of the index in the years studied showed an upward trend in all provinces and oscillated from 0.013% to 0.139%. Figure 2 shows the average bankruptcy rate for the provinces in the year under study.

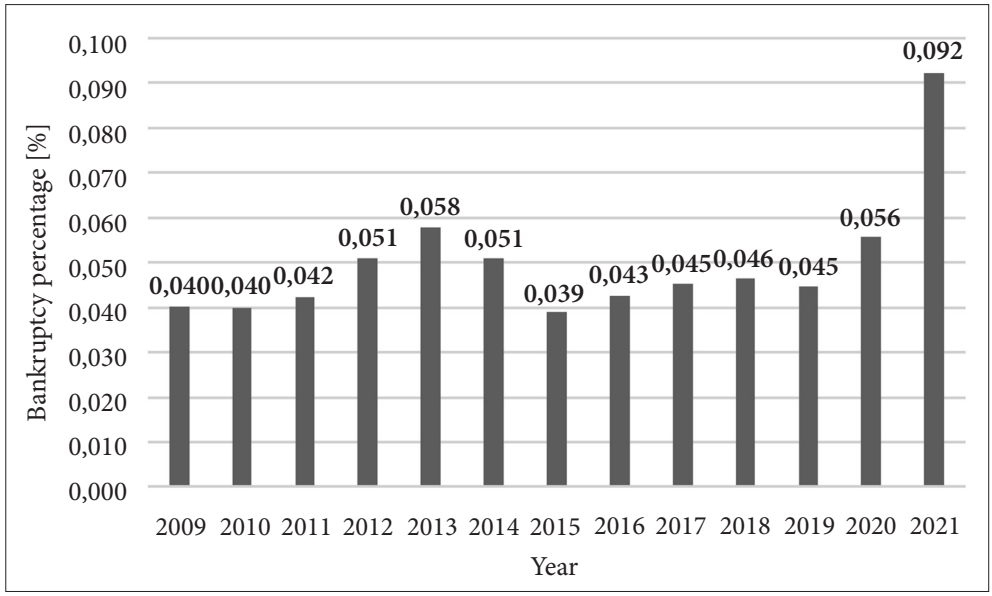

Figure 3. The average bankruptcy rate in the Polish provinces in 2009-2021

Source: own calculations

In 2009-2020, the average bankruptcy rates for provinces did not change significantly and were between 0.039% and 0.058%, which means that 39 to 58 enterprises per 100 thousand functioning entities in the province declared bankruptcy. In 2021, a sharp increase in the average bankruptcy rate to 0.092% was observed, meaning that 92 per 100 thousand functioning entities in the province declared bankruptcy. This is most likely the impact of restrictions related to the Covid-19 pandemic.

The average value of the rate by province is shown in Fig. 4.

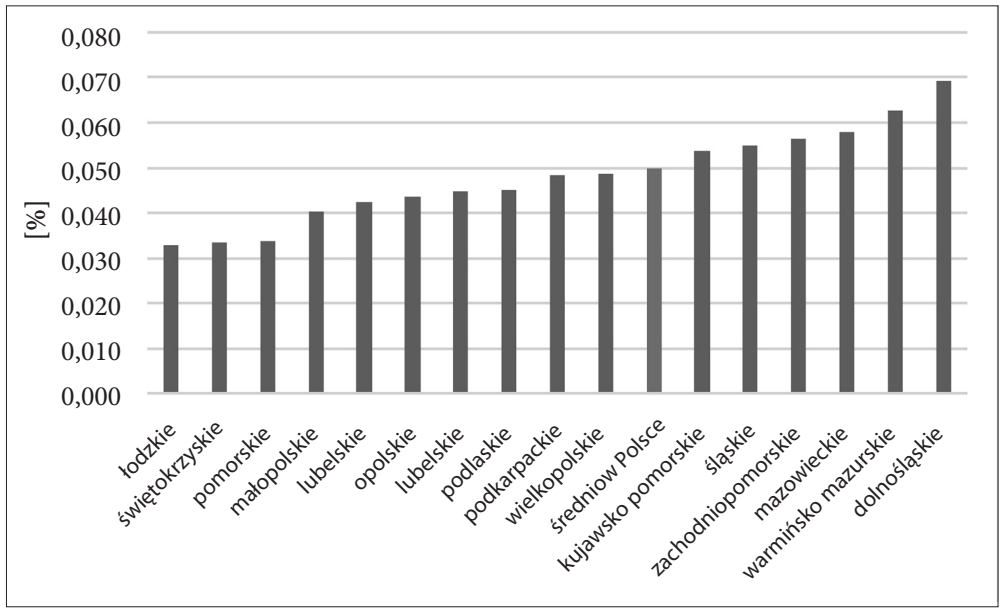

Figure 4. Average bankruptcy rate from 2009 to 2021 by province in Poland

Source: own calculations

When analyzing the data in fig. 4, it can be seen that the average bankruptcy rate above the average in the years studied was in the following provinces: Śląskie, Warmińsko-Mazurskie, Mazowieckie, Zachodniopomorskie, and Kujawsko-Pomorskie. In order to assess changes in the number of bankruptcies and the number of companies over time, their average rates of change were compared (see Fig. 5).

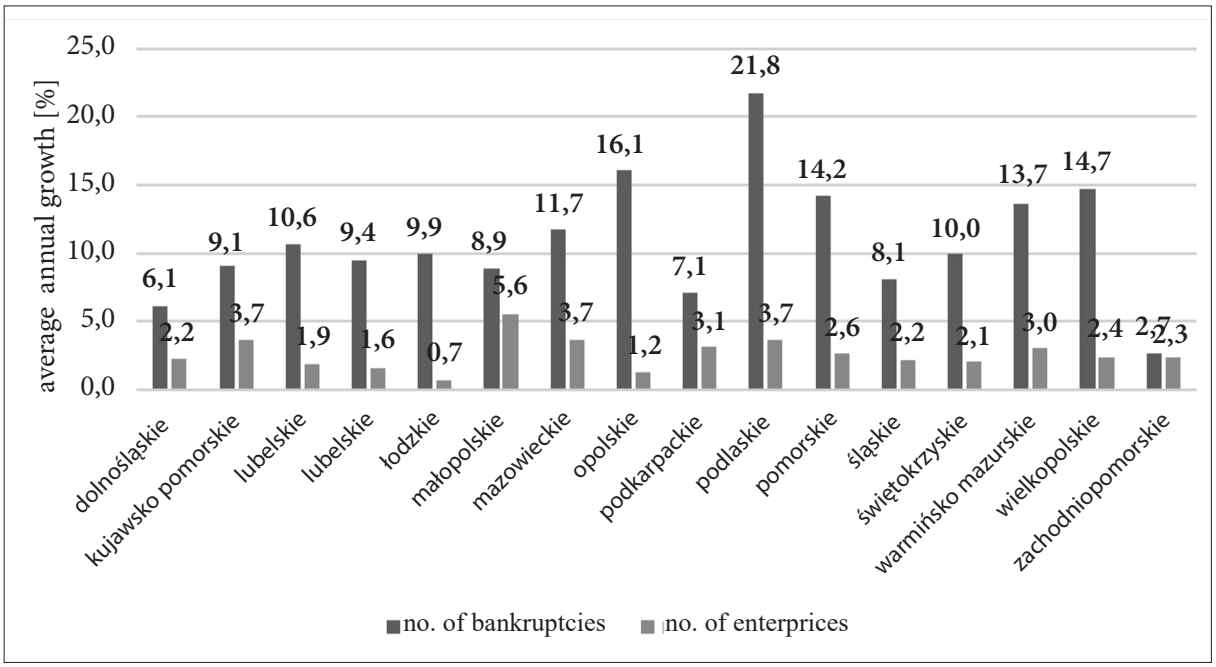

Figure 5. Dynamics of the number of bankruptcies and the number of enterprises in 2009-2021 by province

Source: own calculations

When assessing the average rate of change in the number of enterprises and the number of bankruptcies in each province, it should be noted that all provinces in the period under review had a higher average annual increase in the number of bankruptcies in relation to the average annual increase in the number of enterprises. The largest average annual increase in the number of bankruptcies was recorded in the Podlaskie Province. Between 2009 and 2021, the number of bankruptcies there grew by an average annual rate of 21.8% with an average annual growth in the number of enterprises of only 3.7%.The province had a bankruptcy rate twice as low as the rate for Poland until 2015, while from 2016 the rate for the province exceeded the national rate. In the second place in terms of the fastest average annual growth of declared bankruptcies was the Opolskie Province, where the number of bankruptcies increased year by year by an average of 16.1%, with an annual average increase in the number of enterprises of only 1.2%. Only the Zachodniopomorskie Province was characterized by a similar average rate of growth in the number of bankruptcies and the number of enterprises, at 2.7% and 2.3%, respectively. It should be noted, however, that this is a province with a fairly high bankruptcy rate.

Figure 6 shows the share of each industry in the number of bankruptcies declared in a given year.

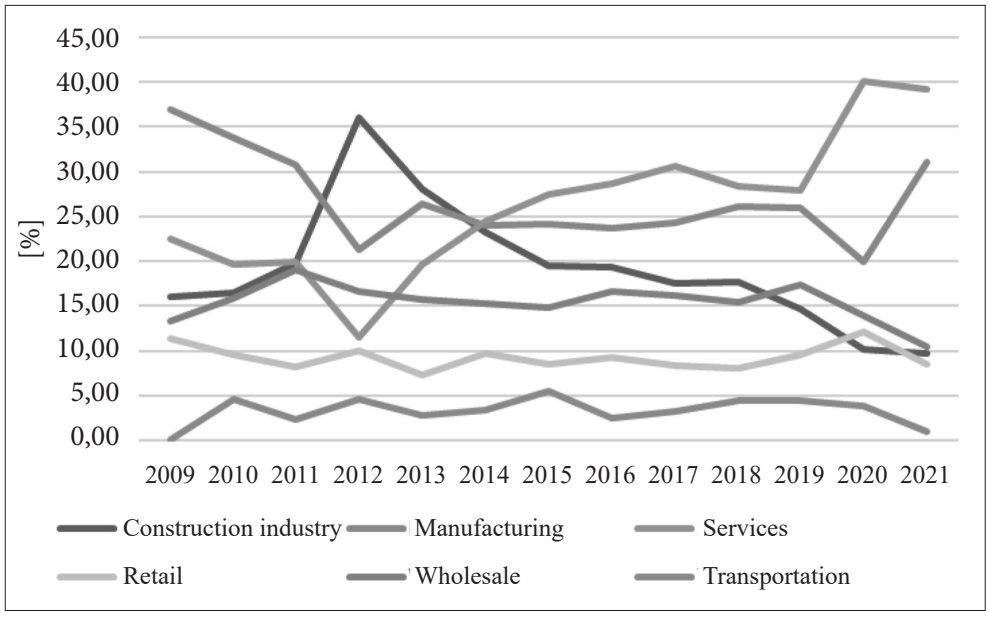

Figure 6. Structure of bankruptcies by industry from 2009 to 2021 in Poland

Source: own calculations

When analyzing the data in Fig. 6, it can be seen that the share of industries in the structure of bankruptcies changed from year to year. The service, manufacturing and construction industries experienced the greatest rate of change. In 2009, manufacturing had the largest share (36.88%) of insolvencies in Poland. From 2011 to 2014, construction dominated (with a share of: 19.84% in 2011, 35.97% in 2012 and 28.09% in 2013). Since 2014, services had the highest percentage of bankruptcies (from 24.38% in 2014 to as high as 39.26% in 2021). No statistically significant correlation was observed between the number of bankruptcies in provinces and individual industries.

Figure 7 shows the structure of bankruptcies by legal form

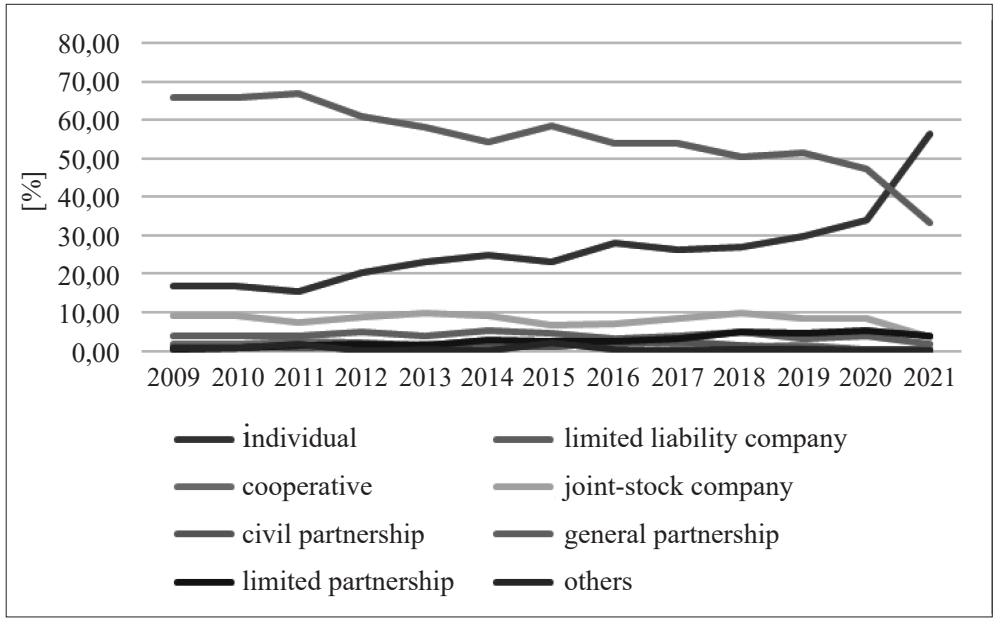

Figure 7. Structure of bankruptcies by industry in 2009-2021 in Poland

Source: own calculations

During the period under study, Poland observed a decreasing share of limited liability companies in the number of bankruptcies from 65.77% in 2009 to 33.33% in 2021, while the share of individuals in bankruptcies increased, rising from 16.95% in 2009 to 56.51% in 2021. Other legal forms did not exceed a 10% share in the number of bankruptcies.

No statistically significant correlation was observed between the number of bankruptcies by legal form and the number of bankruptcies in the provinces.

In the next stage of the research, a two-stage cluster analysis was carried out on the basis of a time sample for the years 2013, 2016 and 2019. The cluster analysis used the available data, which included the following quantitative and qualitative variables: province, industry, legal form, turnover and employment (in the year before bankruptcy). The purpose of the study was to assess the structure of companies by the variables listed. The SPSS Statistics package was used for classification with the distance measure being the reliability quotient.

Classification results using all of the above variables did not yield good grouping quality in terms of Silhouette measure values. A province is not a good predictor, since the Polish market has the largest number of limited liability companies and those registered in the Mazowieckie Province. Therefore, employment size and turnover were used as predictor variables for classification. Classification using these variables in each of the years studied was characterized by a measure of consistency and distinctiveness of more than 80%, which indicates a very good division of companies into clusters and a good level of validity of the predictor variables (see the results in Table 1). The results of the classification are shown in table 2.

Table 1. Evaluation of model fit and validity of variables

	2013	2016	2019
average value of Silhouette measure	0.8	0.9	0.9
number of clusters	3	3	2
Predictor validity: turnover employment	 1 0.98	 0.93 1	 0.8 1

Source: own calculations

Table 2. Classification results

Year	Cluster no.	Share of companies in the cluster [%]	Average annual employment in the cluster	Average annual turnover in the cluster [PLN million]	Dominant industry in the cluster (share)	Dominant legal form in the cluster (share)
2013	1	95	50	3.6	Construction (34%)	Limited liability company (61.3%)
	2	4	436	5.2	Manufacturing (61.9%)	Joint-stock company (61.9%)
	3	1	116	108	Wholesale (40%)	Joint-stock company (40%) and limited liability company (40%)
2016	1	97	61	5.2	Services (19.3%)	Limited liability company (55.9%)
	2	2	72	117	Manufacturing (28.6%) and wholesale (28.6%)	Limited liability company (71.5%)
	3	1	1544	2	Retail (66.2%)	Joint-stock company (66.7%)
2019	1	96	53	19.5	Manufacturing (31.4%)	Limited liability company (59.3%)
	2	4	615	306	Manufacturing (37.5%)	Joint-stock company (56%)

Source: own calculations

The classification results show changes in the structure of the groups of companies that declared bankruptcy in 2013, 2016 and 2019.

Three classes of companies that declared bankruptcy in 2013 can be identified. Among them the dominant ones (95%) were the entities with an average of 50 employees in the year prior to bankruptcy, and with an average annual turnover of 3.6 million. The majority in this class were companies in the construction industry and operating in the form of limited liability companies. Only 4% of the companies that declared bankruptcy in 2013 were entities with an average of 436 employees, with an average turnover of 5.2 million, operating mostly in the form of a limited liability company in the manufacturing industry. The third group accounted for a marginal portion of companies that declared bankruptcy (only 1% of the total). These were companies in the industry - wholesale with relatively large average annual turnover and average employment of more than 100 people.

For the 2016 data, the cluster analysis used identified three groups of companies that had declared bankruptcy. The dominant group (97%) were entities in the services industry, operating in the form of a limited liability company, with an average of 61 employees and an average annual turnover of PLN 5.2 million. The second group (2% of enterprises) consisted primarily of companies in the manufacturing and wholesale industry, with an average of 72 employees and a relatively high average annual turnover of PLN 117 million. The third group of enterprises had a marginal share of insolvencies (only 1%).

In 2019, only two clusters were identified. Among the entities that declared bankruptcy, 96% were companies with an average employment of 53 people, average annual turnover of PLN 19.5 million. Most operated in the manufacturing industry, in the form of a limited liability company. The second class included entities with an average annual employment of 615 people, average annual turnover of PLN 306 million. Most operated in the form of a joint stock company in the manufacturing industry.

Conclusions

The phenomenon of bankruptcy is a natural part of the market economy, whose occurrence at the current stage of its development is well known in business circles. The scale of its occurrence, its extent and the determinants of its development have become the subject of intense discussion among researchers dealing with issues related to the occurrence of risk, in particular, the risk of corporate bankruptcy. Extremely dynamic environment, uncertainty about the effects of many occurring phenomena, the directions of their changes, can become a source of many serious financial problems in enterprises, often leading to bankruptcy. The scale of the phenomenon is subject to change over time and affects different groups of entities to varying degrees. During the period analyzed in Poland, most of the bankrupt entities had an average turnover in the year preceding its announcement, i.e. between PLN 3.6 and 19.5 million, and an average number of employees of 50-60 people. At the same time, among the bankrupt entities, an upward trend was noted in the area of turnover in subsequent years. It was found that the scale of bankruptcies in the area of individual industries has fluctuated and so, for example, in 2013 the construction industry was the most affected, in 2016 the services industry, and in 2019 the manufacturing industry. At the same time, the results of the conducted analysis indicate that the largest percentage of the total number of bankruptcies declared concerned enterprises operating in the form of limited liability companies.

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