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The role of ESG in default early warning

Summary: The purpose of this article is to verify whether there is a research gap referring to the potential application of ESG-related information in bankruptcy early warning signals. There is a problem of a strong information asymmetry in the enterprise-investor relationship, with the issuer being the privileged party. The problem is so urgent that, undoubtedly, the global effect of the crisis caused by the COVID-19 pandemic will be a sharp increase in the number of economic entities threatened with insolvency and bankruptcy. The question then arises – can environmental, social and governmental (ESG) criteria be used as elements of the bankruptcy early warning system?
The study covers the time period beginning January 2016 through June 2021 and includes scientific indexed in the Web of Science Core Collection database provided by Clarivate Analytics. The following research hypothesis guides this study: There is a research gap referring to the role of ESG-related information in bankruptcy early-warning systems. To verify the hypothesis (H0) the model was built, based on the concept of citations count regression (Staszkiewicz, 2019).
The study confirmed the existence of a research gap indicated in the research hypothesis. Possible legal obligation referring to the disclosure of certain ESG-related, standardized information sets would be helpful to diminish the market information asymmetry. Research shows, that strong regulatory activities support the ESG-compliant performance of a business venture (Ortas et al., 2019). Also, standardization of ESG rating criteria and evaluation process would be helpful in this matter and would endure comparability of sourcing data and outcome.

Keywords: early warning of bankruptcy, ESG

Rola ESG we wczesnym ostrzeganiu przed niewypłacalnością i bankructwem

Streszczenie: Celem niniejszego artykułu jest sprawdzenie, czy istnieje luka badawcza odnosząca się do potencjalnego zastosowania informacji ESG w sygnałach wczesnego ostrzegania przed bankructwem lub upadłością.

W relacji przedsiębiorstwo-inwestor występuje problem silnej asymetrii informacyjnej, w której stroną uprzywilejowaną jest emitent. Problem jest na tyle palący, że niewątpliwie globalnym skutkiem kryzysu wywołanego pandemią COVID-19 będzie gwałtowny wzrost liczby podmiotów gospodarczych zagrożonych niewypłacalnością i upadłością. Pojawia się zatem pytanie – czy kryteria związane z relacjami środowiskowymi, zarządczymi czy społecznymi (ang. *environmental, social, governance*, ESG) mogą być wykorzystane jako elementy systemu wczesnego ostrzegania przed bankructwem? W badaniu przyjęto następującą hipotezę badawczą: Istnieje luka badawcza odnosząca się do roli informacji związanych z ESG w systemach wczesnego ostrzegania przed bankructwem. W celu weryfikacji hipotezy (H0) zbudowano model oparty na koncepcji regresji zliczania cytowań (Staszkiewicz, 2019) w oparciu o dane (artykuły naukowe) indeksowane w bazie Web of Science Core Collection, przygotowywanej przez Clarivate Analytics, pochodzące z okresu styczeń 2016 – czerwiec 2021. Przeprowadzone badania potwierdziły istnienie luki badawczej w przedmiotowym obszarze. Dodatkowo wykazały, że ewentualny obowiązek prawny odnoszący się do ujawniania określonych, ustandaryzowanych zestawów informacji związanych z ESG byłby pomocny w zmniejszeniu asymetrii informacji rynkowej. Silne działania regulacyjne wspierają funkcjonowanie przedsięwzięć biznesowych zgodnie z ESG (Ortas et al., 2019). Również standaryzacja kryteriów oceny ESG i procesu oceny byłaby pomocna w tej kwestii i mogłaby jednocześnie wzmocnić porównywalność danych źródłowych i wyników.

Słowa kluczowe: sygnały wczesnego ostrzegania przed bankructwem, sygnały wczesnego ostrzegania przed upadłością, ESG

JEL: G11, G33, M14, Q01

Introduction

Bankruptcies of business ventures are recognized as immanent elements of a free-market economy, being *the essential fact about capitalism* (Schumpeter, 1942). Companies rise and fall due to various causes, both connected with endogenic as well as exogenic reasons (e.g. being the outcome of liquidity crisis induced by COVID-19 pandemic). The existence of an economic venture as well as its discontinuance impacts many diverse stakeholders, both on micro and macro levels.

The ceasing of economic activities induces far-reaching consequences including but not limited to shareholders, employees, and contractors. It also impacts capital investors, for whom the bankruptcy of the company results in the loss of the capital invested. In the globalized world, where in general a free flow of capital exists, the materialized risk of bankruptcies influences the performance of the economies, induces the increase of the rate of unemployment, and generates irreversible changes in the local business ecosystem. Moreover, it also breaches trust in capital markets and their ability to correctly assess investment risk. The results of the fact that one company is going bankrupt are wide-spreading

and are not limited only to financial losses, but also impact more delicate layers of economic activities – social, psychological, and connected with interpersonal relationships.

The turbulent economic environment of the late XX and early XXI centuries provoke inevitable questions concerning the impact of human economic activities on the wellbeing of the planet and all creatures alive. The paradigm of economic activities focused only on the maximization of the rate of return for capital owners seems to be retiring. The new, ascending paradigm stresses the fact, that economic activity is never taking place without impact on a wide variety of agents and elements in the environment of the enterprise. Certainly, it impacts other business entities, government and non-government agencies, and organizations, employees, and their families. Not to mention, that ESG-compliant activities may build value also for the shareholders (Azmi et al., 2021b)social, and governance (ESG.

However, the focus of the new paradigm is not limited only to even very widely recognized stakeholders (Johnson et al., 2019b). It also stresses the need to strive for the best interest of those agents, which so far did not have strong business advocacy. However, since the publication of "Limits of Growth" (Meadows et al., 1972) the issue of rational management of natural resources became an immanent part of public debate, it is just the last few years when it is trending.

The pollution of air, water, and soil, large-scale deforestation, forest robbery, extinction, or endanger of extinction for many species of biological life are only a few of many examples of the negative results of human economic activity. They are also the obvious implications of irresponsible consumption. All of them not only threatens the future of biological life on Earth but also endanger the future of mankind as well. Not to mention, that the Covid-19 pandemic revealed a growing scarcity of rare Earth minerals being the indispensable substrate for sustainable development of informational society. At the beginning of the XXI century, the questions referring to rational management of resources and conscious, sustainable development became even more significant.

This is also the issue that is being taken into consideration when assessing the economic activities of enterprises under the conditions of ESG (economic, social, and governance) criteria. The robust development of the concept of ESG ratings goes in line not only with the rational necessity of sustainable development. It also corresponds with the growing trend of conscious investing and financing policies of numerous financial market institutions of the type of mutual funds, investment banks, or even regulatory bodies.

Since the ESG criteria are extensive and cover all aspects of the economic activity of an enterprise, they may give a wider overview of the economic activity than just pure financial data. Therefore, they may give grounds for reasoning referring to the probability of bankruptcy of a business entity. Also, since the impact of a company shortfall is far-reaching, the question arises if it is possible to estimate the probability of bankruptcy with the use of information from the scope of ESG? Can then ESG-related information become the early warning signals that may foreshadow the collapse of a business venture? Taking the above into consideration, the following hypothesis was formulated:

H0: There is a research gap referring to the role of ESG-related information in bankruptcy early-warning systems.

The hypothesis formulated above was verified based on the data that were acquired from the Web of Science (WoS) Core Collection for the period begun in 2016 and terminated in June 2021. Next, the results from the database were verified with the citations count regression model (Staszkiewicz, 2019) to avoid the judgmental choice of sources and to indicate leveraged publications. Next, the theoretically informed analysis was performed including all leveraged publications, but not limited to these.

The next six sections of this article are structured as follows. The first section is devoted to the literature review of publications referring to the ESG and the bankruptcy early-warning systems. In the next section, there is a brief description of the data sourcing and methodology used. It is followed by the section of the analysis of the model outcome and the section of conclusions. Finally, the two last sections contain the discussion of the findings and summary of the research as well as the brief outline of the future research plans.

Literature review

ESG as the performance indicator

ESG is the commonly used acronym for environmental (E), social (S), and corporate governance (G) aspects of economic activities. These three elements represent very wide dimensions, that allow assessing the sustainability of business and responsibility of entrepreneurial activities (Johnson et al., 2019b). In the most general approach, if a company is willing to follow ESG standards, then it should avoid any potential negative effect of today's business operations on the living conditions of future generations (Johnson et al., 2019a).

It was proven, that the impact of being ESG-compliant is not limited to responsibility understood generally and more skewed towards ethics. It is also connected with the financial performance of the company. Not only the ESG-compliant operations allow for sustainable development of a company and the environment. They may also go in line with financial performance. The relationship between ESG and financial performance is rooted in various economic concepts. Certain elements are derived from the stakeholder theory and trade-off theory (La Torre et al., 2021); (Azmi et al., 2021a)social, and governance (ESG; (Adamska et al., 2016). From the standpoint of the behavior of companies, it is

Table 1 **Examples of ESG Issues**

Environmental issues	Social issues	Governance issues
climate change and carbon emissions	customer satisfaction	board composition
air and water pollution	data protection and privacy	audit committee structure
biodiversity	gender and diversity	bribery and corruption
deforestation	employee engagement	executive compensation
energy efficiency	community relations	lobbying
waste management	human rights	political contributions
water scarcity	labor standards	whistleblower schemes

Source: Environmental, Social, and Governance issues in investing. A Guide for Investment Professionals, p. 4

investigated by legitimacy theory (Karwowski & Raulinajtys-Grzybek, 2021) (Santamaria et al., 2021). Therefore, the conscious choice of ESG-compliant operations does not have to be connected with the trade-off between ethics and profitability. Companies, having different stakeholders (including employees, local communities, and societies), have an ethical obligation to address their diverse expectations within environmental, social, and governance dimensions to maximize general value for stakeholders. The specific role is also designed for the shareholders (shareholders activism or shareholders engagement) (Yamahaki & Frynas, 2016).

The concept of ESG is closely linked to Corporate Social Responsibility (CSR). It is often perceived as an evolution of CSR and this is also the standpoint, that the authors of this article prefer. Despite the robust literature on CSR, there is still no congruity in defining this concept (Martínez-Ferrero et al., 2021). However CSR refers to the same three areas of corporate activities, ESG includes governance explicitly and this might the clear dividing line between these two concepts. Still, it cannot be resolved as e.g. the definition of CSR presented by the European Commission (European Commission, 2011) and other international agencies like UNIDO does include also G factor ("a concept whereby companies integrate social and environmental concerns in their business operations and their interactions with their stakeholders").

The UN World Summit on Sustainable Development in 2002 in a will to encourage proactive, pro-CSR activities, indicated "voluntary initiatives, including environmental management systems, codes of conduct, certification and public reporting on the environmental and social issue" in this context (United Nations, 2002). It then also, indirectly, points the role of governance factors. ISO 26000 defines CSR as is the responsibility of enterprises for their impacts on society, while ISO 26000 defines CSR as the responsibility of an organization for the impacts of its decisions and actions on society and the environment, through transparent and ethical behavior in key areas such as organizational governance, human rights, labor practices, the environment, fair operating practices, consumer issues, community involvement, and community development.

Having this in mind, one may notice, that CSR constitutes a kind of general direction of economic and business development guidelines. Whereas ESG is focused on actual verification of the exact activities of business ventures and implies certain, more precise criteria that allow for assessing these activities. This way of thinking could be supported with an abrupt explosion of numerous stock exchange ESG indices, that exhibit the performance of stocks of publicly traded companies that were positively verified under ESG criteria.

Also, there are dedicated, specialized rating agencies that developed their expertise in the rating of business ventures' activities compliance with ESG criteria. Following a similar pattern as credit rating agencies, ESG rating agencies provide interested parties with brief and concise information, usually in the shape of a certain rating grade. Therefore, the ESG rating is more suitable and practical for the possible statistical models that would be targeted at assessing the risk of bankruptcy, and the observation of the changes in this rating may constitute a kind of pre-sensitivity analysis in the context of a company default risk. ESG brings clarification in the scope of sustainable corporate practices, indicating

three principal areas: environmental, social, and corporate governance. Santamaria et al. emphasized the actual intensification of ESG-related activities of business entities. They referred to this phenomenon as to *ESG movement* and defined it as a shift from declarations and debates to real actions in ESG practices (Santamaria et al., 2021).

The ESG is also related to Socially Responsible Investments (SRI). This could be treated as the reflection of the ESG movement but limited to the capital markets, where responsible investors include environmental, social, and corporate governance criteria alongside financial in the decision-making process (Friede, 2019) (Johnson et al., 2019b). Following ESG-related information, they may select for their portfolios the securities issued by companies, that act in line with certain sustainability guidelines. Investors perceive ESG as a set of extra-financial criteria that can be adapted into investment decision-making processes useful for the valuation of potential business investments (Azmi et al., 2021b)social, and governance (ESG, (Badía et al., 2020), (Siddiqui & Marinova, 2019)the VC fund managers have developed a set of risk management practices appropriate for the industry which include investment syndication. Furthermore, the VC funds are supplied by individual and institutional investors with different risk profiles and investment focus, usually in finite amounts and for a limited period of time. The funding agreement between the VC firms and the fund investors combined with the limited amount and time can lead to additional funding liquidity risks as the VC funds are invested in the portfolio companies. In this paper, we develop a simple two period model from a VC firm's perspective with funding liquidity constraints to demonstrate how funding liquidity risk can influence syndication decisions. We subsequently analyze the implication of the model, derive a set of predictions and validate them with VC investment data from Australia. The analysis shows that syndication has both instrumental function in risk management and behavioral implications on risk culture essential for addressing the emerging frontiers of sustainability risks.",

Thus, they need to know how companies build long-term value, how they manage ESG risks, and take responsibility for their impact on the environment. Public companies are encouraged to disclose ESG – related information mainly in the form of annual non-financial reports to "provide equity and nonequity stakeholders with reliable, comparable, and relevant information about three categories of risk factors that may affect an organization's future performance, and therefore, its value" (Schiehll & Kolahgar, 2021), (Tiron-Tudor et al., 2019)under the institutional lens. Moreover, the paper emphasises whether Romanian Energy (Oil \\& Gas and Utilities. The scope and nature of ESG disclosure vary across the world and depend on various factors (Mans-Kemp & van der Lugt, 2020)sustainability performance and financial performance of listed companies in South Africa. Setting: The study is conducted in the country where integrated reporting is most established. The links between the IRQ of the Top 100 companies listed on the Johannesburg Stock Exchange and their environmental, social and corporate governance (ESG) (Hua Fan & Michalski, 2020) (Santamaria et al., 2021). To enhance the comparability of reports, companies are encouraged to disclose ESG information following generally accepted standards and reporting frameworks: GRI, IIRC or SASB.

As it was already mentioned, in answering the growing demand from investors, certain ESG metrics were developed: ESG ratings and ESG indices. ESG ratings are based on particular methodologies developed by rating providers, thus they can vary greatly. Rating providers evaluate companies being equity and debt issuers using their ESG disclosures (Duque-Grisales & Aguilera-Caracuel, 2021). ESG ratings can be used in a variety of investing strategies as they have emerged as an important pillar of CSR for the development of sustainable strategies that affect the financial performance (FP) of multinational firms (Duque-Grisales & Aguilera-Caracuel, 2021).

ESG indices are also based on the specific approach of index providers. The purpose of such indices is to provide global standards for identifying and investing in socially responsible companies and measuring their economic, social, and environmental performance. In addition, they may also serve as facilitators of the investment decision process and, at the same time, they may minimize the costs of acquiring information.

The traditional way of evaluating the performance of a company and its financial standing is focused on analyzing a variety of financial data derived primarily from financial statements and financial disclosures. Investors and other stakeholders have recently begun to consider the additional, non-financial criteria that relate to the company's ESG activities. It is assumed that ESG practices may potentially bring risk-reducing benefits for a business entity (Johnson et al., 2019b). Therefore, they also may play a significant role in the bankruptcy early-warning systems.

The role of early warning systems

The need to develop bankruptcy early warning systems (financial distress prediction models) and tools stems directly from the aim to eliminate the asymmetry of information between the company and its environment. Fast and accurate identification of the bankruptcy risk enables to take actions aimed at mitigating the negative effects of such an event, in particular, limiting the financial costs for third parties.

All classic models of forecasting corporate bankruptcy are based on specific financial aggregates. The data on which they are based mainly come from the financial statements of the analyzed companies. An unquestionable advantage of such models is the objectivity and regularity of this data. Consequently, it is possible to calculate indicators at regular time intervals, monitor their volatility, and search for regularity (regularity), which is of considerable importance in the context of forecasting ability.

Assessing bankruptcy risk is critical for investors making equity or bond investment decisions, as well as management making finance, investment, and distribution policy decisions. Bankers, rating agencies, and even struggling companies themselves can benefit from bankruptcy prediction models (Altman et al., 2017).

The method for predicting bankruptcy has changed throughout time: from models based on univariate analysis for the selected ratio to multiple discriminant analysis models. A breakthrough in research on enterprise bankruptcy prediction models was the development of a multidimensional bankruptcy prediction model by E.I. Altman in 1968 and its improved versions in subsequent years: 1977 and 1983 (Dec, 2009).

After 1968 there has been a rash of various models inspired by the Altman model. They were based on statistical tools like logit analysis and probit analysis. The models of Altman (1968), Ohlson (1980), and Zmijewski (1984), which are based on accounting variables, are the most quoted in the bankruptcy prediction literature (Bărbuță-Mișu & Madaleno, 2020). After 1990, authors of business failure and bankruptcy prediction models have started to use artificial intelligence (AI), machine learning, and neural networks: Tam and Kiang (1992), Altman et al. (1994), Wilson and Sharda (1994), Fletcher and Goss (1993), Lee et al. (1996), Wang & Wu (2017) (Shi & Li, 2019). However, Alaka et al. indicate that there is a lot of models based on AI, "having several relatively undesirable features which include computational intensity, absence of formal theory" (Alaka et al., 2018). Despite the above-mentioned challenges, thanks to the use of new technologies, the predictive accuracy of models increases.

Since the input that could be sourced from ESG analysis is wide and highly informative, it could be of benefit to utilizing these data also in the context of bankruptcy prediction.

Research gap

Having analyzed the research on the interaction between ESG ratings and the use in bankruptcy early-warning systems, one may discover, that there is a profound research gap in this regard. The data from the Web of Science Core Collection prove, that one cannot identify a single publication that would refer to this issue.

Therefore, the hypothesis (H0), referring to the identification of the research gap connected with the use of ESG ratings in the bankruptcy early-warning systems, should be approved.

Methodology and data

The purpose of this article is to verify the existence of a potential research gap referring to the possible use of ESG-related information as an element of bankruptcy early-warning systems. In cases when research is significantly dependant on the analysis of the literature, the risk of judgmental selection of publications may arise. It may result in the bias of focusing on well-known and recognized papers, therefore omitting those with less publicity. This may result in the danger of duplicating the same views, not noticing new, sometimes insightful research.

To limit the risk of this bias, to verify the hypothesis (H0) the model was built, based on the concept of citations count regression (Staszkiewicz, 2019). Data for this model originate from the Web of Science Core Collection database provided by Clarivate Analytics. These were the publications selected based on the criteria of the topic ("ESG" and/or "bankruptcy early-warning"), publication timeframe (2016-June 2021), Web of Science categories ("business" and "economics") as well as language (English) and Web of Science Index (Social Sciences Citations Index).

Based on this query, a sample of 183 publications was identified. Next, out of this sample, the model identified 12 leveraged publications, so these with the most significant impact. All of the leveraged publications were studied for this article. To provide the com-

prehensive outcome of the analysis, the theoretically informed analysis of the subsample of leveraged papers was conducted.

Analysis and discussion

The model, that was applied for the research (the citations count regression) allowed to confirm the statement of the null hypothesis (H0). At the same time, the outcome of the research allows for the conclusion, that there is a significant research gap concerning the analysis of the applying ESG-related information to the bankruptcy early-warning systems.

Based on the citations count regression model, the authors confirm the H0 hypothesis about the lack of publications that refer to the impact of HFT in the form of AI-supported trading on market allocation efficiency. Within the research sample, the model did not acknowledge a single paper investigating this issue. Based on these findings, the research gap is identified and the H0 is confirmed.

It is confirmed that there is an information asymmetry between the company and its stakeholders, with the first to be the privileged party. The company has a broader scope of information concerning its business operations, financial standing, or the risk of potential default. Due to numerous reasons, companies may not be interested in reducing this asymmetry. Potential initiatives with this regard may however be efficiently induced with the help of regulatory requirements.

Certain aspects or elements still may however be excluded from disclosure, at the same time, having an impact on the bankruptcy risk assessment. Therefore, it is natural, that third parties, including business partners or potential investors, may be interested in obtaining additional information signalling the risk of bankruptcy at its earliest possible stage. The same applies to other stakeholders in the manner of credit rating agencies, ESG rating agencies, or even government agendas e.g. monitoring the job market. Some researchers postulate the integration of ESG-related reporting with regular financial reporting (Mans-Kemp & van der Lugt, 2020)sustainability performance and financial performance of listed companies in South Africa. Setting: The study is conducted in the country where integrated reporting is most established. The links between the IRQ of the Top 100 companies listed on the Johannesburg Stock Exchange and their environmental, social and corporate governance (ESG.

Globally, the theme of social responsibility was present in the public discussion since at least the early 1960s. Its importance in portfolio management and the decision-making process began trending significantly after the subprime crisis. It was also connected with the upsurge of the discussion related to the social responsibility of financial institutions and afterward – with the problem of generally decreasing quality of life on Earth in the face of shrinking natural resources and their worsening quality.

These elements, connected with environmental, social, and governance areas are becoming one of the key decision factors, equal in importance to others like growth potential and the financial standing. Large financial institutions, that manage assets of mutual funds or pension funds, declare the withdrawal from the financing of business ventures that do not

comply with the rules of sustainable development. A proactive, pro-sustainability approach gets premium with wider access to capital and/or lower cost of capital.

If then the wide ESG criteria are already accepted in financial markets in the investment decision-making process, then there is no rationale why they can not be utilized also in other business areas, e.g. those connected with risk modelling. They can also be implemented as elements of bankruptcy early-warning systems. Compliance with ESG standards seems no longer to be a niche, rather a mainstream requirement of the modern investment process. Especially, that failing to comply in line with ESG standards may provoke the rise in the weighted-average cost of capital or limit liquidity sourcing, therefore increasing the risk of default. Generally speaking, the social responsibility of the companies is inevitably both a permanent market requirement and an ethical duty of modern enterprises.

However, it needs to be stated, that there are certain limitations of the ESG ratings themselves, that may impact the value of ESG ratings as credible information. The basis for the ESG rating is recognized as an alternative, non-financial data, highly context-dependent and "unstructured, qualitative, scattered, and incomplete" (In et al., 2019). Therefore, such data are vulnerable to judgmental assessment. Combining this with the fact, that there are not any general rules or guidelines that would require the standardization of the data sourcing, quality of data, or quality of judgment, one may argue on the reliability of such data. Every rating agency is allowed to exist and free to select both the criteria as well as the source of data, based on which the rating will be prepared.

The same objections apply to the problem of data and ESG rating comparability. The fact of generally low quality of data and the lack of industry general standard for information assessment generates risk, that ESG ratings may not be sufficient and credible both for the short-run (one-off analysis) and for the long run (continuous verification). As a result, applying ESG ratings on a large scale may generate the impression that the informational asymmetry is to be diminished, however, it may indeed not be the case.

Also, however, the concept of ESG assessment is recognized and begins to be widely accepted, there is still quite an area of freedom in formulating the criteria. Depending on the rating agencies, the scope of the information collected under e.g. the environment criterion may vary. The same is with the assessment of this information. There may be an approach applied based on the concept of negative criteria only (e.g. punishing for non-ecological behavior) and the concept based on positive criteria (based on which even coal mine may be positively verified if takes pro-ecological activities) as well as both.

Certainly, there are some steps taken to downsize the risk described above. There are proposals of United Nations Principles for Responsible Investments that are designed with this target. The same applies to Global Reporting Initiative (Global Reporting Initiative, 2013). However, Santamaria et al. emphasize that ESG metrics are particularly subjective due to a lack of transparency and standardization. As a result, the information provided by ESG ratings and indices is often inconsistent, especially when the methodology is not disclosed (Santamaria et al., 2021).

It is also worth mentioning, that the ESG-related data needs to be assessed taking into consideration the specific features of the market they come from. Research shows, that the

interpretation of certain ESG-related elements may vary from market to market (Husted & Sousa-Filho, 2019). Partially this could be explained by the pace of economic development and prioritization of ESG-compliant policies (Duque-Grisales & Aguilera-Caracuel, 2021).

Another important argument in the discussion about the relevance of ESG data refers to the analytic side of the rating preparation. There is a great amount of information that is generated by a single company and could be of relevance for stakeholders. Not to mention, that the weight of specific information change over time. Therefore it is valuable to rethink the rating process, the weight of ESG disclosures (Schiehll & Kolahgar, 2021), and the role of artificial intelligence in it. In such a case also the question arises about the timeframe of allocative decisions. The postulates of sustainable growth do not go in line with financial market short-termism that seems to prevail nowadays (In et al., 2019).

In addition, however, the theme of ESG-compliance is trending, still, the concept and the tools offered are not sufficiently utilized by stakeholders. Some of them may not be convinced about the potential premium resulting from the use of ESG-related information and may be afraid of potential costs of access (In et al., 2019). There are also the opinions, that the integration of ESG criteria into the decision-making process may result in the performance worsening, e.g. due to the fact of the limiting of investment universe (Eccles et al., 2007). If aggregated with the doubts about data quality, these factors may effectively limit the growth pace of the ESG market as a whole. As a result, a large package of information is at its disposal, but still difficult to use efficiently.

Arguably to the paragraph above, there are studies, that prove that the correlation between portfolio performance and ESG-compliance of issuers is dependent on many factors. Among them, the most influential are geographical allocation, time frame and ESG criteria applied. However, the positive correlation of performance and investing in line with ESG grows with the growing awareness of ESG requirements and meaning (Badía et al., 2020). What is more, the positive impact of portfolio selection in line with ESG criteria grows in times of less favorable environment of high credit spreads, slowdown, and high inflation rates (Hua Fan & Michalski, 2020). The last finding may indirectly positively support the idea of using ESG-related information and ratings in the bankruptcy early-warning systems. This is because of the fact, that the risk of bankruptcy grows in unfavorable economic conditions.

Another concern is connected with the fact, that it is possible to easily collect data concerning public companies, listed on stock exchanges. Such entities are obliged to publish certain required information regularly and on the grounds of strictly defined criteria. Therefore, these companies are easy to be research-covered by stakeholders or rating agencies. Unfortunately, this does not apply to non-listed companies. It is acute since the percentage of non-listed companies in a given economy is higher than the percentage of listed companies. Also, since the population is larger, the actual number of bankruptcies per annum would be higher in the non-listed group. Therefore, the general impact of bankruptcies in this group can be estimated as more significant than in the other.

Finally, the positive effect of running business activities in line with ESG standards seems to cause natural positive feedback in a shape of a certain perpetuum mobile. A

company with a more culturally diverse board tends to promote pro-ESG activities, which leads to better performance in social and environmental terms (Martínez, Ferrero et al., 2021).

Summary and conclusions

The purpose of this article was to verify whether there is a research gap referring to the potential application of ESG-related information in bankruptcy early warning signals. The research confirmed that such a research gap exists indeed. Within the timeframe of 2016-June 2021, there were not many research papers published that would cover this matter and be indexed in the Web of Science Core Collection database.

The article covers the most important ideas concerning the concept of ESG and its role in the current economic environment. Since ESG covers all major aspects of economic activities and analyses many aspects of it in many, cross-sectional dimensions, it seems it is a good candidacy of data sourcing for bankruptcy early-warning systems. Therefore, the information derived during the procedure of ESG rating obtaining may be of significant value for many groups of interest.

Hence, this article may be of value not only for capital investors in their decision-making process but also for policymakers concerning the importance and significant value of also non-financial criteria in the process of company evaluation. Possible legal obligation referring to the disclosure of certain ESG-related, standardized information sets would be helpful to diminish the market information asymmetry. Research shows, that strong regulatory activities support the ESG-compliant performance of a business venture (Ortas et al., 2019). Also, standardization of ESG rating criteria and evaluation process would be helpful in this matter to endure comparability of sourcing data and outcome.

This research is certainly not free from certain limitations. In general, they are the result of the data selection criteria applied. The data were rooted from the Web of Science Core Collection database, provided by Clarivate Analytics – one of the largest, well know and highly recognized sources. However, extending research to other databases and widening the research timeframe may impact the results.

Undoubtedly, it would be of value to continue the research and focus on constructing a statistical model to prove the possible relationship of ESG-related information and ratings, and the probability of bankruptcy of a business venture.

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