

Article

A New Approach for Risk of Corporate Bankruptcy Assessment during the COVID-19 Pandemic

Katarzyna Boratyńska 

Department of Finance, Institute of Economics and Finance, Warsaw University of Life Sciences—SGGW,
Nowoursynowska 166 Street, 02-787 Warsaw, Poland; katarzyna_boratynska@sggw.edu.pl; Tel.: +48-22-59-34-275

Abstract: The consequences of COVID-19 will aggravate existing multidimensional risks and reveal new ones. The research gap allows contributing to recognizing the exogenous risk factors of corporate bankruptcy during the COVID-19 pandemic in EU countries. This study aims at revealing how to evaluate the risk of corporate bankruptcy phenomenon in the COVID-19 times. The question arises as to whether Schumpeter's creative destruction approach is still accurate. The article concentrates on implementing the fsQCA (fuzzy set Qualitative Comparative Analysis) method to identify and evaluate the main exogenous drivers of corporate bankruptcy in EU countries based on Fragile States Index data. This new approach focuses on fuzzy sets theory. The fsQCA method is a globally recognized alternative to quantitative analysis (in which the causal complexity is ignored) and qualitative methods for examining individual cases (which do not have the tools to generalize on their basis). The research indicates and examines the main external factors that would increase the risk of corporate bankruptcy in EU countries: namely, economic decline, uneven economic development, unemployment rate, demographic pressure, and government debt. The study discusses the influence of zombie companies on economies during the COVID-19 pandemic. Identifying risk factors that determine the threat of corporate bankruptcy may constitute practical recommendations for business and restructuring practitioners, financial institutions, and banking and public sector representatives in creating warning and recovery measures during the COVID-19 pandemic.

Keywords: risk of corporate bankruptcy; the COVID-19 pandemic; uncertainty; zombie companies



Citation: Boratyńska, Katarzyna. 2021. A New Approach for Risk of Corporate Bankruptcy Assessment during the COVID-19 Pandemic.

Journal of Risk and Financial Management 14: 590. <https://doi.org/10.3390/jrfm14120590>

Academic Editor: Vanja Piljak

Received: 13 September 2021

Accepted: 27 November 2021

Published: 7 December 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Risk and uncertainty during the COVID-19 pandemic have increased not only globally and nationally but also locally. The SARS-CoV-2 coronavirus, which causes the COVID-19 disease, has destabilized the global economy and financial markets and thus significantly changed the functioning of, among others, countries, business entities, and individuals. The lockdown of economic activity primarily affected tourism and caused a collapse in stock exchanges, which directly affected the real sector of the economy. In order to emphasize the impact of the spread of the coronavirus on the economy, De Alwis (2020) uses a new term, “coronomics”, which is a merger of the two terms “corona” and “economics” and it studies the negative consequences of the coronavirus for the economy. Coronomics is about the economic fallout from the coronavirus.

The coronavirus outbreak has influenced many areas of activity, including not only tourism, passenger transport (road and air), the automotive industry, the hotel and catering industry, and global supply chains, but it has also intensified many negative phenomena, e.g., fluctuations in the prices of financial instruments, information asymmetry, financial instability, corporate bankruptcies, and unemployment. This generates huge public and private costs, and it is crucial from economic and social perspectives. The consequences of COVID-19 will aggravate existing multidimensional risks and reveal new ones. This is most apparent in health and education, which are the building blocks of sustainable development in fragile contexts. This is significant to mitigate the impact of COVID-19 and

build back better by resourcing resilience, restoring livelihoods, and supporting employees' potential (Boratyńska 2021). The COVID-19 pandemic shows the research gap that allows contributing to recognizing the risk factors of corporate bankruptcy during the COVID-19 pandemic in EU countries. The question arises as to whether Schumpeter's creative destruction approach is still accurate.

What have not been thoroughly analyzed are external determinants of risk of corporate bankruptcy declarations in the COVID-19 pandemic times. This paper intends to contribute to the analysis by identifying and interpreting the main external factors of risk of corporate bankruptcy in EU countries by using fsQCA¹ (fuzzy set Qualitative Comparative Analysis). This method focuses on fuzzy sets theory. The fsQCA method is a globally recognized alternative to quantitative analysis (in which the causal complexity is ignored) and qualitative methods for examining individual cases (which do not have the tools to generalize on their basis). According to Ragin (2008), both of these limitations can be overcome by explicitly setting the logic of case-based research and extending this logic to quantitative data via Boolean algebra. Ragin developed a method of comparing cases as a configuration of factors leading to a result (Ragin 1987). Boratyńska (2016) implements fsQCA method to identify and assess the main causes of corporate bankruptcy in food industry.

This study aims at revealing how to evaluate the risk of corporate bankruptcy phenomenon during the COVID-19 times.

The study uses business registration and bankruptcy index that presents results for EU countries. The study focuses the Fragile States Index data to point out the main factors that would lead to corporate bankruptcy. Research covers 2020.

Globally, the financial support that has been provided during the pandemic exceeds already nine times its level from the period of the previous crisis, namely 2007–2008. These phenomena pose new challenges for the economies in EU countries. Therefore, there is a research gap regarding the recognition of new risk factors and the scale of risk and its scope in an economy operating under COVID-19 conditions. It is worth undertaking theoretical and empirical research in this area, using the existing theories, and research results, taking into account the complexity of new challenges.

This article shows how a new approach can overcome the knowledge gap of current conceptual attempts to assess risk of corporate bankruptcy under the COVID-19 pandemic conditions. The research indicates and examines the main factors that would increase the risk of corporate bankruptcy in EU countries: namely, economic decline, uneven economic development, unemployment rate, demographic pressure, and government debt. As a result of the COVID-19 pandemic and anti-crises measures, the national budgets deficit is growing, and its reduction will be one of the main tasks of the post-crisis period. It points out that anti-crisis measures, by their nature, can create conditions for promoting the zombie-ing of the economy. This is worth examining if these policies may create "zombies" by reducing the exit of non-productive firms.

2. Literature Review

A framework for corporate bankruptcy assessment adjusted to COVID-19 pandemic conditions should also indicate the zombie-firms issue. The number of this kind of unproductive company has been increasing during the pandemic. A link between a corporate bankruptcy and a zombie-firm issue exists. It is worth emphasizing that keeping the zombie-firm alive and fed from government financial support has a negative impact on the economy and society.

Risk is an event that may occur in the future, and its consequences may cause negative or positive changes in business activities. According to Sakai (2016) risk and uncertainty play a central role in Knight's concept. Sakai (2016) discusses three different types of Knight's probability situations, namely: a priori probability, statistical probability and "estimates" or "judgments". Uncertainty arises from a lack of full knowledge of the occurrence of possible future states. The difference between the uncertainty and risk in

terms of Knight concerns the possibility of estimating the probability of occurrence of particular categories of future events only (Sakai 2016).

Over the course of an economic expansion, financial markets become increasingly susceptible to instability in response to any random shock. In terms of stock markets, Goodell and Huynh (2020) analyzed the abnormal returns of 49 industrial sectors from 9 December 2019 to 28 February 2020. Mazur et al. (2021) investigated the US stock market performance during the crash of March 2020, which was triggered by COVID-19. Ashraf (2020) examined the stock markets' response to the COVID-19 pandemic using daily COVID-19 confirmed cases and deaths and stock market returns data from 64 countries over the period 22 January 2020 to 17 April 2020.

Uncertainty occurs when scientific knowledge cannot be used to determine the nature of future events. Thus, the main role is assigned to an entrepreneur who based on judgment of future uncertain events makes decisions about the company's operations.

Right and constructive decisions contribute to an entity's success, while wrong decisions may trigger a deterioration of the company's financial standing and even lead to its bankruptcy. Risk and uncertainty characterize external and internal environment (processes, resources, organizational structure). Four basic actions against particular types of risk are pointed out: namely, risk avoidance, risk reduction, risk transfer, and risk taking.

Schumpeter (1942) discusses the importance of risk and uncertainty in the actions of entrepreneurs who dynamize the economic system.

Uncertainty is also a concept that refers to the possibility of accurate forecasting (economic forecasts try in vain to eliminate the uncertainty of the future and deprive entrepreneurship of its inherent speculative character). This approach is useful in interpreting data on trends from the recent past. Transaction costs reduce uncertainty. The level of uncertainty cannot be permanently eliminated; it can only be reduced.

The main reasons for economic fragility in Central and Eastern European countries were discussed by Boratyńska (2021). Efforts to support the access of fragile contexts to domestic and international financing should include mechanisms to reduce the volatility of financial flows and prepare for so-called black swan events. A black swan is an "unknown" where its very existence is not recognized or predicted. The United Kingdom (UK) Food Standards Agency (FSA) describes "unknown unknowns" and black swans as "future circumstances, events or outcomes that are impossible to predict, plan for, or even to know where or when to look for them" (Manning et al. 2020, pp. 289–90). Fuzzy logic-based risk assessment considers that a single variable can be a member of multiple groups; e.g., it can capture uncertainty, vagueness, and aggregated risk that if one event happens, this then makes a second event more likely (Manning et al. 2020, pp. 289–90).

The research refers to the economics of crisis approach. In Nassim Nicholas Taleb's theory, the crisis is described as a "black swan in the order of events", which is a phenomenon that is very rare and difficult to predict (Roubini and Mihm 2011, p. 34). Nouriel Roubini argues with this statement, describing it as "the white swan". According to him, crises are predictable and quite often recurring phenomena (Roubini and Mihm 2011, p. 35). According to the above theory, COVID-19 is the "black swan in the order of events".

The global financial crisis began before 2008 as the result of many factors. However, the most significant were the problems with the real estate and mortgage markets in the United States and the abuse of complex financial instruments. Coronavirus affects all areas of human life and has negative consequences for business and the economy. Coronavirus is an external and unpredictable factor.

It is worth emphasizing the role of Corporate Social Responsibility (CSR) in crisis times. Burlea et al. (2017) presents the European aspects of CSR in the following countries: Switzerland, Italy, the Netherlands, Cyprus, and Romania. According to Burlea et al. (2017), the financial crisis has a negative impact on corporate social responsibility programs.

In terms of risk management in the field of finance, the pandemic, the same as the global financial crisis (2007–2009), belongs to the category of "systemic risks". Therefore, it is recognized that COVID-19 should be subject to systemic risk management (Kanno 2021).

Yet, the effect of COVID-19 on the financial economy may be even greater than the effect of the global financial crisis. From a global perspective, for example, as of 6 November 2020, the operating profit for Toyota, which has production and sales locations worldwide, is expected to decrease by 46% for the fiscal year ending 31 March 2021 (Kanno 2021).

A few studies concentrate on the economic effects of COVID-19 and policy response mitigating its impact on the EU countries (e.g., Zinecker et al. 2021). Zinecker et al. (2021, p. 743) assume that behavioral patterns can be explained by heuristics and use the qualitative trend analysis to develop and explore how the COVID-19 contagious disease and the EU's policy response may affect macroeconomic output. This study shows that many authors agree that as a result of the pandemic, we might face the most serious economic and social crisis since the outbreak of the Great Depression in 1929 (Zinecker et al. 2021, p. 742). The modern world economy requires the identification of the existing uncertainties and possible risk factors that may significantly affect corporate bankruptcies.

The COVID-19 pandemic as a shock has caused various effects in different dimensions of fragility, including economic, financial, political, and social problems on a large scale (Banerjee and Rai 2020).

During the COVID-19 crisis, companies more often delay the fulfillment of obligations, and there is a deterioration or even loss of financial liquidity. Many companies have difficulties obtaining funds to finance their activities, and those that have taken out investment loans have difficulties with repayments. It seems that the concept of “risk” somehow evolves toward the classic definition of uncertainty due to the complexity of measurement.

A business cycle depends on financial activity (Fisher 1933, pp. 337–57) and well-functioning banks that support technological innovation by identifying entrepreneurs who have the greatest opportunities of implementation of innovative products or processes. Schumpeter (1942, pp. 1–431) supports this approach.

Financial fragility arises from the widespread practice of companies using debt contracts to finance production. In a debt contract, the borrowing firm receives finance from a lender in exchange for promising a contractually fixed stream of interest and principal payments (debt service) over the duration of the loan. The failure of the borrowing company to make one of these contractual payments triggers its bankruptcy, which interrupts the enterprise's normal operation and puts its other creditors at risk of not receiving the payment of their contracted debt service.

The common research flow studying bankruptcy can be divided into two areas: the first one is failure prediction (Altman et al. 2017); the second is the theoretical and empirical investigations of the process leading to failure (Lukason and Laitinen 2019). Bellovary et al. (2007) traced the historical summary of bankruptcy prediction studies and introduced the trends in this area. They found that there were over 150 models available in the research literature at the moment of their review, many of which show the high predictive ability, but practitioners poorly used these models. Early works (Altman 1968) used only financial ratios, but modern authors significantly expanded the list of applicable features. For example, they use corporate governance indicators (Liang et al. 2016; Jones 2017) or macroeconomics indicators (Chen 2011; Zelenkov et al. 2017).

Bankruptcy prediction models can be divided into three main categories: statistical (e.g., Altman 1968), machine learning (Barboza et al. 2017; Zelenkov et al. 2017), and theoretical models. It is worth emphasizing that the literature does not present many theoretical models. The COVID-19 pandemic reality needs to be described well using also conceptual models, and this paper contributes to overcoming the existing gap in this issue (compare to Zelenkov and Volodarskiy 2021—they discuss only the first two categories of bankruptcy prediction models).

Recent works (Barboza et al. 2017; Zelenkov et al. 2017) prove that machine learning models improved bankruptcy prediction accuracy over traditional models; also, researchers proposed a lot of new financial ratios that improve the quality of prediction.

[Kanno \(2021\)](#) introduces the multivariate GARCH model proposed by [Engle \(2002\)](#). The model is a dynamic multivariate regression model, in which the conditional variances and covariances of the errors follow an autoregressive moving average structure. The DCC multivariate GARCH model uses a nonlinear combination of univariate GARCH models with time-varying cross-equation weights to model the conditional covariance matrix of the errors.

The literature presents methods of predicting bankruptcy that are the so-called early warning models that came into being on the basis of large-scale comparisons of two types of enterprises—the one that went bankrupt and the one that enjoys a very good financial situation. It is worth stressing that these kinds of models usually do not take into account both qualitative and external variables. These models include financial indices calculated on the financial statements of a company.

The methodology part of this study concentrates on a detailed description of fsQCA. [Ragin \(2008\)](#) defined the doctrines of the two major parties: quantitative and qualitative. According to [Vaisey \(2009\)](#), Ragin's work is an alternative to quantitative analysis (which assumes away causal complexity) and qualitative case-based methods (which lack tools for generalizing across cases). Both limitations, [Ragin \(2008\)](#) states, can be overcome by making explicit the set-theoretic logic of case-based research and by extending this logic to quantitative data via Boolean algebra. This study model uses qualitative and external (exogenous) variables and combine quantitative and qualitative approach for a better and more innovative approach to corporate bankruptcy risk evaluation.

However, despite a significant number of publications, the conclusion of [Bellovary et al. \(2007\)](#) is still valid: existing models are poorly used in real life, so researchers should attempt to establish a stronger connection with business and regulators.

Following the introduction, the next section will present the methodology section. This discusses the Fragile States Index and concentrates on the fsQCA method, which has a great potential for analyzing risk factors that lead to corporate bankruptcy. Then, this article presents results and research contribution. Finally, the study ends up with a discussion, limitations, and finally, the conclusions, which stress the specific value added of the approach.

3. Materials and Methods

The study implements the conceptual model of factors of risk diffusion under the COVID-19 pandemic conditions (Figure 1). This is like a melting pot where the COVID-19 pandemic is an initial factor of risk diffusion influences on spreading risk factors that threaten business continuity. There is a triple relationship between COVID-19, risk factors, and the threat of corporate bankruptcy. The COVID-19 pandemic as a risk factor would also trigger a direct relationship with the threat of corporate bankruptcy. This risk diffusion model points out two-way interactions between certain risk factors and the threat of corporate bankruptcy. These risk factors are interconnected and intervene with each other. The global epidemic crisis related to the spread of the SARS-CoV-2 coronavirus would affect the emergence and intensification of recession and the economic crisis in the long run. A manifestation of these crisis phenomena in the economy are financial problems and, consequently, bankruptcies of enterprises and the resulting job liquidation.

The research sample consist of 27 EU countries. The article uses [Fragile States Index powered by the Fund for Peace Data and Indicators \(2020\)](#), [Eurostat \(2021\)](#), and [International Monetary Fund Data \(2021\)](#).

The study concentrates on implementing the fsQCA method to identify and evaluate the main exogenous drivers of corporate bankruptcy in EU countries based on selected Fragile States Index data collection.

The paper presents a literature review concerning the impact of COVID-19 on economies and corporate bankruptcy issues including methods of corporate bankruptcy prediction assessment.

The Fragile States Index data and indicators 2020 were employed for data collection ([Fragile States Index powered by the Fund for Peace Data and Indicators 2020](#)). This index is based on twelve indicators divided into three groups: namely, social, economic, political, and military. The article focuses mainly on economic and social indicators as appropriate for data analysis and the scope of this study.

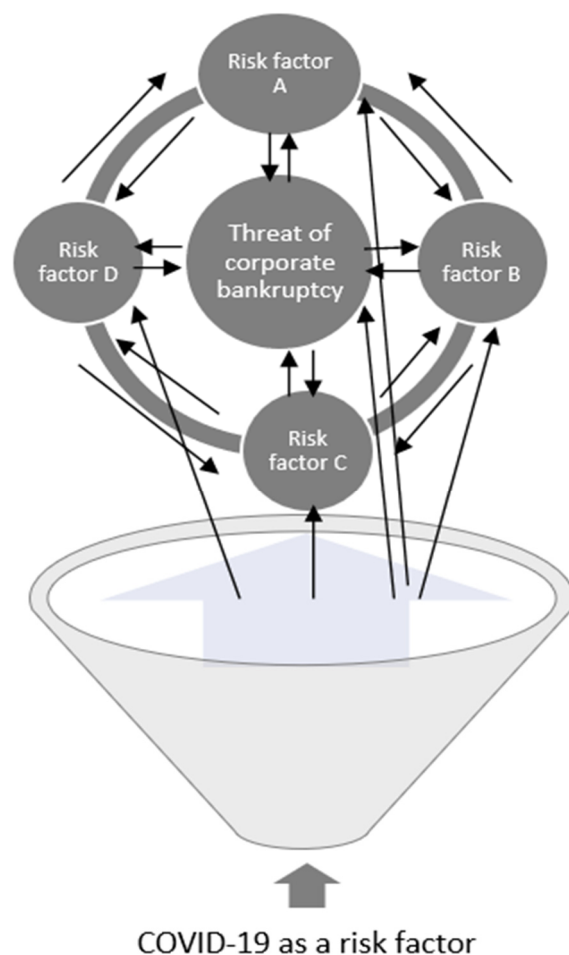


Figure 1. Risk diffusion model in the COVID-19 pandemic. Source: Own study.

The study uses also business registration and a bankruptcy index that presents results for EU countries ([Eurostat 2021](#)).

The research presents the following hypothesis: The risk of corporate bankruptcy declarations has been increased in EU countries during the COVID-19 pandemic.

The application of fsQCA to cross-case evidence comprises three distinct phases:

1. Selecting cases and constructing a truth table that defines their causally relevant characteristics;
2. Testing the sufficiency of causal conditions;
3. Deriving and interpreting the results ([Ragin 1987, 2000](#)).

Qualitative Comparative Analysis (QCA) is an analytic technique for the study of different cases, or configurations of aspects, that can lead to the same outcome. Both the theory and the mechanics of the fsQCA 2.5 software program ([Ragin 2008](#), pp. 87–121; [Ragin and Davey 2014](#)) are useful to obtain information on relevant recipes and have an importance in economic fragility evaluation because “such analyses provide a useful match among the tenets of complexity theory and the inherent complexity of relationships in data” ([Woodside 2014](#), p. 2502). FsQCA is a program that uses combinatorial logic, fuzzy set

theory, and Boolean minimization to point out what combinations of case characteristics are necessary or sufficient to produce an outcome.

The program starts with a data matrix. Although this lists the cases as rows, as with a conventional data matrix, in the columns, case characteristics are not variables in the usual sense, but degrees of membership of a defined category, namely a bankrupt case or non-bankrupt case. Membership may be binary: cases are either members or non-members of a category. A fuzzy set allows the calibration of the degree of set membership, using scores in the interval of 0.0 to 1.0. Membership scores above 0.5 shows that a case is more in than out, while scores close to 1.0 indicate that a case is mostly in, and scores close to 0.0 describes that a case is mostly out. Full membership (1.0) and full non-membership (0.0) are qualitative states, not arbitrary values (e.g., highest and lowest scores). The conditions use a six-value fuzzy set measurement scale (the interval from 0.0 to 1.0, namely: 1 = fully in; 0.8 = mostly in; 0.6 = more or less in; 0.4 = more or less out; 0.2 = mostly out; 0 = fully out) or a dichotomous approach (1 = fully in, 0 = fully out). Fuzzy sets are binary and metric at the same time (Boratyńska and Grzegorzewska 2018).

In QCA, the fundamental unit of analysis is the truth table row, along with the cases conforming to each row. Casual combinations represent all logically possible sections using the causal conditions. Each row of the truth table constitutes a different logically possible selection, and each row contributes to the outcome. The truth table shows multiple selections of the independent variables and multiple tests of sufficiency (Ragin 2000).

The first step in the minimization process is to select the rows displaying the outcome and compare them. Here, the objective is to simplify them through a bottom-up process of paired comparison (Ragin 1999, pp. 1225–39). The next step is the analysis of the fsQCA results. A specific cause or combination of causal conditions constitutes one of several possible paths to an outcome. Set-theoretic consistency evaluates the degree to which the cases sharing a given condition or combination of conditions. Consistency points out how closely the subset relation is approximated. Set-theoretic coverage evaluates the degree to which a cause or causal combination contributes for instances of an outcome. When several paths to the same outcome exist, the coverage of any causal combination may be small. Thus, coverage gauges empirical relevance (Ragin 2006, p. 292).

4. Results

This part of the article presents Fragile States Index data evaluation using the fsQCA method. QCA comprises several steps. The first step was to construct a truth table. Stage two reduced the number of rows in the truth table. Establishing necessary conditions highlighted cases that lead to the outcome. During the third stage of analysis, following a review of the truth table, an algorithm simplified combinations and minimized solutions.

The fsQCA method analyzes and interprets the EU countries' empirical data, which were collected from the [Fragile States Index powered by the Fund for Peace Data and Indicators](#) (2020). The study analyzes and uses the data of the Fragile States Index that consists of four main groups and 12 indicators. The data set includes also two more indicators that rely on Eurostat and International Monetary Fund Data. Thus, the study analyzes 14 indicators in total. These groups consist of economic, social and cross-cutting, cohesion, and political indicators. All these groups are interconnected and intervene with each other. Economic indicators include the economic decline indicator, the uneven economic development indicator, and the human flight and brain drain indicator. The next part of the article focuses and describes economic indicators in detail ([Fragile States Index powered by the Fund for Peace Data and Indicators](#) 2020).

The economic decline indicator considers factors related to economic decline within a country. For example, the indicator looks at patterns of progressive economic decline of the society as a whole as measured by per capita income, Gross National Product, unemployment rates, inflation, productivity, debt, poverty levels, or business failures. It also takes into account sudden drops in commodity prices, trade revenue, or foreign

investment, and any collapse or devaluation of the national currency. The economic decline indicator considers the responses to economic conditions and their consequences.

The uneven economic development indicator shows inequality within the economy, irrespective of the actual outcome of an economy. For example, the indicator looks at structural inequality that is based on group or based on education, economic status, or region (such as urban–rural divide). The indicator also takes into account the opportunities for groups to improve their economic status, such as through access to employment, education, or job training.

The human flight and brain drain indicator considers the economic impact of human displacement (for economic or political reasons) and the consequences this may have on a country's development.

The unemployment rate is the number of unemployed persons as a percentage of the labor force (the total number of people employed and unemployed) based on the International Labour Office (ILO) definition. The indicator monitors high and persistent rates of unemployment and it supports to better understand the potential severity of macroeconomic imbalances. It reports toward a potential misallocation of resources and general lack of adjustment capacity in the economy. The unemployment data are seasonally adjusted. The data source is the quarterly EU Labour Force Survey (EU LFS), [Eurostat \(2021\)](#), and [International Monetary Fund Data \(2021\)](#). The EU LFS covers the resident population in private households.

The article indicates the following 14 exogenous factors of risk of corporate bankruptcy declarations in EU countries: economic inequality, economy, human flight and brain drain, government debt, unemployment rate, public services, state legitimacy, human rights, demographic pressures, refugees and IDPs, external intervention, security apparatus, factionalized elites, and group grievance.

All 14 conditions comprise the five main groups, namely: (1) economic decline and poverty (EDECLINE), (2) uneven economic development (UNEDEV), (3) government debt (GDEBT), (4) unemployment rate (UNEMPLOY), and (5) demographic pressure (DEPRESS).

The created model is as follows:

$$\text{Risk of corporate bankruptcy declarations} = f(\text{EDECLINE}, \text{UNEDEV}, \text{GDEBT}, \text{UNEMPLOY}, \text{DEPRESS}).$$

The outcome and selected conditions correspond to the codification that Appendix A presents (see Table A1 in Appendix A). The outcome (risk of corporate bankruptcy declarations) is a dichotomous variable distinguishing countries with a high risk of corporate bankruptcy declarations from those with small risk of corporate bankruptcy declarations (coding a high risk of bankruptcy case as 1). The analysis explains which conditions lead to the outcome (corporate bankruptcy declarations) in analyzed EU countries.

The coverage presents empirical relevance or importance. [Ragin \(1987\)](#) developed set theory for comparing cases as configurations of conditions. FsQCA allows indicating types of cases as different configurations of attributes. A specific cause or combination of causal conditions constitutes one of several possible paths to an outcome. When this assumption is true, cases displaying the causal combination constitute a subset of the cases displaying the outcome. Set-theoretic consistency assesses the degree to which the cases sharing a given condition or combination of conditions. Consistency indicates how closely the subset relation is approximated. A simple, straightforward measure of the consistency of a set relation with sufficiency is the proportion of cases with a given cause or combination of causes that also displays the outcome. For example, if 17 out of the 20 cases displaying a cause or causal combination also display the outcome, then the proportion consistent is 0.85. Consistency scores should be as close to 1.0 (perfect consistency) as possible. Perfectly consistent set relations are relatively rare. Perfect consistency usually requires small Ns, macroeconomic level data, or both. [Ragin \(2006, p. 293\)](#) recommends a minimum consistency of 0.75. Establishing necessary conditions should highlight cases that lead to

the outcome. When consistency scores are below 0.75, to maintain on substantive grounds that a subset relation exists is increasingly difficult, even a very rough one. Scores between 0 and 0.75 indicate the existence of substantial inconsistency. Conversely, cases where the outcome is not present are irrelevant and are thus absent when testing propositions (Ragin 2006, p. 293).

The fsQCA method allows verifying and evaluating if economic indicators are the main drivers of fragility in EU countries. Table 1 presents the results of selected necessary conditions that lead to corporate bankruptcy declarations.

Table 1. Results of analysis of selected necessary conditions. Outcome variable: risk of corporate bankruptcy.

Conditions Tested	Consistency (Minimum Consistency of 0.75)	Coverage
economic_inequality_cal	0.247368	1.000000
~ economic_inequality_cal	0.752632	1.000000
economy_cal	0.352632	1.000000
~ economy_cal	0.647368	1.000000
human_flight_brain_drain_cal	0.347368	1.000000
~ hu-	0.652632	1.000000
man_flight_brain_drain_cal	0.568421	1.000000
government_debt_cal	0.431579	1.000000
~ government_debt_cal	0.552632	1.000000
unemployment_rate_cal	0.447368	1.000000
~ unemployment_rate_cal	0.173684	1.000000
demographic_pressure_cal	0.826316	1.000000
~ demographic_pressure_cal		

(~) means negation of condition. Source: Own study.

According to the results, consistency does not exceed 0.75 for any conditions (Table 1). Thus, any condition on its own assures the risk of corporate bankruptcy declarations. These results do not confirm the hypothesis that the risk of corporate bankruptcy declarations level has been increased in EU countries during the COVID-19 pandemic. This is in line with French research results that indicate a relatively low level of corporate bankruptcy and the good economic standing of the French economy because of government financial support.

5. Discussion

The study discusses the effects of the COVID-19 pandemic in different areas, including economic, financial, and social problems on a large scale.

The research shows that the scale of economic and social problems is significant, because the crisis has been affecting the real economy, while during the previous recession, it affected only the monetary sphere. Global supply chains have been broken and will be expensive and time consuming to rebuild. Furthermore, it seems that so far, we have never dealt with such a high risk and complexity regarding the scale of problems and uncertainty in an economy and business activity. This study would contribute with recommendations that could support policy makers in the public and private sector in formulating their future actions and strategies as an opportunity for effective recovery. They would benefit from the outcome in different ways. The results can be used in shaping economic policy concerning, first of all, the role of the state in monitoring tools for recognizing the impact of COVID-19 on corporate bankruptcy processes and preventing crisis phenomena or zombie-ing effects, as well as offering various forms of financial support for business continuity. The negative consequences of the COVID-19 pandemic that affected economies in various countries to different extents highlighted the essential role of anti-crises policy responses. Thus, the research has an impact on the economy and society from the perspective of recovery, renewal, and resilience.

Mauro F. Guillén (2020) points out that many managers have come to assume that everything will change. Accordingly, the strategy for survival is supposed to be a thorough transformation of the entire enterprise—or else a bankruptcy filing. He indicates that business models conducive to short-term survival along with long-term resilience and growth. It is worth considering that the number of bankruptcies in 2020 has not increased in the majority of developing countries as one could expect, and this phenomenon can be explained by the huge state financial support and anti-crises responses by governments to mitigate the negative financial and economic impact of the COVID-19 pandemic. Recent studies show that in France, the number of bankruptcies has decreased significantly by 36% in 2020 in comparison to 2019 (Cros et al. 2021).

As a result of governments' financial support, the corporate bankruptcy risk factors, namely, economic decline and uneven economic development, have a too low consistency level (minimum is 0.75) and are outside the final model. This is in line with French research results that indicate a relatively low level of corporate bankruptcy and the good economic standing of French economy because of public financial intervention. The results do not confirm the hypothesis.

According to Bernanke and Gertler (1990), the policy analysis suggests that under some circumstances, government “bailouts” of insolvent debtors may be a reasonable alternative in periods of extreme financial fragility.

In March 2020, central banks in 42 developing countries cut interest rates, according to the World Bank, which was far more than in any month in 2008. A number of central banks have also bought sovereign bonds, helping governments provide as much stimulus as they dare (Emerging Markets 2020).

In a small, open, developing economy, it is likely that the state will come under pressure to absorb the debts of firms in periods of financial fragility in one way or another. Thus, the financial fragility of the private sector is converted into the financial vulnerability of the public sector, and the financial crisis that occurs can appear in the form of a crisis of public finance and foreign exchange reserves (Foley 2001).

Sordi and Vercelli (2006) use qualitative dynamic analysis and numerical simulations to investigate the interaction between financial fragility, which is modeled in terms of structural instability, and dynamically unstable financial fluctuations. Goodhart et al. (2006, p. 107) claim that the model they present is rich enough to include heterogeneous agents, endogenous default, multiple commodities, and credit and deposit markets. Financial fragility in this model emerges naturally as an equilibrium phenomenon. The model also indicates how monetary policy may affect financial fragility, thus highlighting the trade-off between financial stability and economic efficiency.

A question arises as to whether these policies may create “zombies” by reducing the exit of non-productive firms (Finance and Economics 2020). The literature highlights the necessity and urgency of cleaning up zombie companies (Jiang et al. 2017). Zombie enterprises represent low operational efficiency and production, and suffer from long-term losses or insolvency. They consume social funds and resources, and although they should have been eliminated by the market, they continue to exist. Research shows that overcapacity is more prominent in industries that have more zombie enterprises (Caballero et al. 2008). They squeeze resources, hinder the emergence of new innovative enterprises, and seriously affect improvements to social productivity. In addition, zombie enterprises have the ability to generate higher losses than other enterprises.

Zombie companies often receive support from external resources. From the perspective of resource allocation, these are direct salvage operations undertaken by the government. The question arises as to why government spend huge amounts of resources keeping zombie companies alive. Although zombie enterprises are inefficient, they can still offer jobs. Within the framework of social exchange theory, local officials are incentivized to allocate government resources to zombie enterprises (Jiang et al. 2017, p. 342). Zombie enterprises obtain the direct support and credit endorsement of the government, and these “blood transfusions” in the form of government subsidies and bank loans are the direct

causes that zombie enterprises persist. Specifically, a zombie enterprise with more jobs to offer receives more government subsidies, but an enterprise's property rights have little to no influence. Furthermore, this kind of "blood transfusion" seldom boosts the enterprise's operating efficiency or value (Jiang et al. 2017).

Considering future research, long-run effects evaluation of the influence of the COVID-19 pandemic on corporate bankruptcy requires a longer perspective of assessment of its negative economic and the financial consequences for EU economies in comparison to non-COVID-19 times. Furthermore, considering that a bankruptcy is a medium- or long-term process, an interesting avenue for future research is to include a time-span factor for further analysis and to determine its importance for the effectiveness of forecasting methods.

6. Limitations

The short run of the conducted analysis is the main limitation of this study. Indicating all factors of risk of corporate bankruptcy requires a long-term approach and further research after the pandemic. The model could be extended in the future research by extending the time framework and/or adding new or eliminating some input data, because the fsQCA methodology allows seeking and evaluating combinations of causal conditions that lead to corporate bankruptcy.

7. Conclusions

This article shows how an fsQCA approach can overcome the knowledge gap of current conceptual and methodological attempts to expose corporate bankruptcy architecture of causalities.

In this study, the author contributes to a theory by identifying and interpreting the main exogenous, economic drivers of risk of corporate bankruptcy declarations in EU countries by using fsQCA in the research.

According to the results, the Fragile States Index, which was analyzed in the article using fsQCA, can be one of the useful tools for practice, warning against failures at the level of economies. It seems that its structure contains too little economic variables in comparison to political and social ones. In the author's opinion, economic factors should gain greater significance in the scope of the discussed issues, but they are limited and marginalized in the index construction. The research does not confirm the hypothesis. As a result of governments' financial support, the corporate bankruptcy risk factors, namely economic decline and uneven economic development, indicated a too low consistency level (minimum is 0.75) and were outside the final model. Models based on financial ratios and indicators of the external environment should be valid in general. However, in the face of external shocks (e.g., COVID-19 pandemic), the process leading to bankruptcy can develop much faster. Therefore, the models must be updated using new data more frequently to reflect these fast-moving changes.

As a result of the coronomics and anti-fragility measures, the national budgets deficits are growing, and their reduction will be one of the main tasks of the post-COVID period. It points out that anti-crisis measures, by their nature, can create conditions for promoting the zombie-ing of the economy.

According to the evolutionary theory of Schumpeter, crisis such as the COVID-19 could indeed foster a new beginning. After the corona crisis and the economic downturn, the phenomenon of Schumpeter's creative destruction has gained new, different importance.

Funding: This research received no external funding.

Data Availability Statement: Publicly available datasets were analyzed in this study. This data can be found here as follows: Business Registration and Bankruptcy Index by NACE Rev.2 Activity—Quarterly Data for 2020 was taken from: https://ec.europa.eu/eurostat/databrowser/view/STS_RB_Q_custom_898579/bookmark/table?lang=en&book (accessed on 15 February 2021). Fragile States Index powered by the Fund for Peace Data and Indicators for 2020 (available at scores and rankings part) were taken from: <https://fragilestatesindex.org/analytics/> (accessed on 10 January

2021). Fragile States Index is powered by the Fund for Peace. General government gross debt level for 2020 was taken from International Monetary Fund Data. This data can be found at <https://www.imf.org/external/datamapper/datasets/WEO> (accessed on 20 February 2021).

Acknowledgments: I thank the journal’s anonymous referees for their useful comments and suggestions.

Conflicts of Interest: The author declares no conflict of interest.

Appendix A

Table A1. Codifications of outcome and selected conditions.

Outcome and selected conditions	Codifications
Outcome	
Risk of corporate bankruptcy case	Bankruptcy
Selected conditions	
Economic inequality	Economic_inequality_cal
Economy	Economy_cal
Human flight and brain drain	Human_flight_brain_drain_cal
Government debt	Government_debt_cal
Unemployment rate	Unemployment_rate_cal
Demographic pressure	Demographic_pressure_cal

Source: Own study.

Note

¹ fsQCA—fuzzy set Qualitative Comparative Analysis, Ragin and Davey (2014).

References

- Altman, Edward I. 1968. Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance* 23: 589–609. [\[CrossRef\]](#)
- Altman, Edward I., Małgorzata Iwanicz-Drozdowska, Erkki K. Laitinen, and Arto Suvas. 2017. Financial distress prediction in an international context: A review and empirical analysis of Altman’s Z-Score model. *Journal of International Financial Management & Accounting* 28: 131–71.
- Ashraf, Badar Nadeem. 2020. Stock markets’ reaction to COVID-19: Cases or fatalities? *Research of International Business and Finance* 54: 101249. [\[CrossRef\]](#)
- Banerjee, Debanjan, and Mayank Rai. 2020. Social isolation in COVID-19: The impact of loneliness. *The International Journal of Social Psychiatry* 66: 525–27. [\[CrossRef\]](#)
- Barboza, Flavio, Herbert Kimura, and Edward Altman. 2017. Machine learning models and bankruptcy prediction. *Expert Systems with Applications* 83: 405–17.
- Bellovary, Jodi L., Don E. Giacomino, and Michael D. Akers. 2007. A review of bankruptcy prediction studies: 1930 to present. *Journal of Financial Education* 33: 1–42.
- Bernanke, Ben, and Mark Gertler. 1990. Financial fragility and economic performance. *Quarterly Journal of Economics* 105: 87–114. [\[CrossRef\]](#)
- Boratyńska, Katarzyna. 2016. FsQCA in corporate bankruptcy research. An innovative approach in food industry. *Journal of Business Research* 69: 5529–33. [\[CrossRef\]](#)
- Boratyńska, Katarzyna. 2021. Determinants of Economic Fragility in Central and Eastern European Countries FsQCA Approach. *European Research Studies Journal* XXIV: 827–37. Available online: <https://www.ersj.eu/journal/2541> (accessed on 20 October 2021). [\[CrossRef\]](#)
- Boratyńska, Katarzyna, and Emilia Grzegorzewska. 2018. Bankruptcy prediction in the agribusiness sector: Lessons from quantitative and qualitative approaches. *Journal of Business Research* 89: 175–81.
- Burlea, Adriana Schiopoiu, Stephen Vertigans, and Samuel O. Idowu. 2017. Corporate Social Responsibility in Times of Crisis: A Summary. In *Corporate Social Responsibility in Times of Crisis. CSR, Sustainability, Ethics & Governance*. Edited by Samuel O. Idowu, Stephen Vertigans and Adriana Schiopoiu Burlea. Cham: Springer. [\[CrossRef\]](#)
- Caballero, Ricardo J., Takeo Hoshi, and Anil K. Kashyap. 2008. Zombie lending and depressed restructuring in Japan. *American Economic Review* 98: 1943–77. [\[CrossRef\]](#)

- Chen, Mu-Yen. 2011. Bankruptcy prediction in firms with statistical and intelligent techniques and a comparison of evolutionary computation approaches. *Computers and Mathematics with Applications* 62: 4514–24. [CrossRef]
- Cros, Mathieu, Anne Epaulard, and Philippe Martin. 2021. Will Schumpeter catch COVID-19? Evidence from France. Available online: <https://voxeu.org/article/will-schumpeter-catch-COVID-19-evidence-france> (accessed on 15 June 2021).
- De Alwis, Ajith. 2020. Coronomics—Plan Your Eggs and the Basket! Available online: <http://www.ft.lk/columns/Coronomics-%E2%80%93Plan-your-eggs-and-the-basket-/4-695109> (accessed on 1 December 2020).
- Emerging Markets. 2020. A Sigh of Relief, a Gasp for Breath, Hong Kong. Short-Term Panic Gives Way to Worries about Long Term Economic Scars. *The Economist*, August 1.
- Engle, Robert. 2002. Dynamic conditional correlation: A simple class of multivariate generalized autoregressive conditional heteroskedasticity models. *Journal of Business and Economic Statistics* 20: 339–50. [CrossRef]
- Eurostat. 2021. Business Registration and Bankruptcy Index by NACE Rev.2 Activity—Quarterly Data. Available online: https://ec.europa.eu/eurostat/databrowser/view/STS_RB_Q__custom_898579/bookmark/table?lang=en&book (accessed on 15 February 2021).
- Finance and Economics. 2020. Why COVID-19 Will Make Killing Zombie Firms Off Harder. *The Economist*, September 26.
- Fisher, Irving. 1933. The debt-deflation theory of great depressions. *Econometrica* 1: 337–57. [CrossRef]
- Foley, Duncan K. 2001. *Financial Fragility in Developing Economies*. New York: Department of Economics, Graduate Faculty, New School University. Available online: <http://joseluisoreiro.com.br/site/link/bc6dcd99253e572c9e18e8a46bc30eb803a3314b.pdf> (accessed on 10 July 2021).
- Fragile States Index powered by the Fund for Peace Data and Indicators. 2020. Available online: <https://fragilestatesindex.org/analytics/> (accessed on 10 January 2021).
- Goodell, John W., and Toan Luu Duc Huynh. 2020. Did Congress trade ahead? Considering the reaction of US industries to COVID-19. *Finance Research Letters* 36: 101578.
- Goodhart, Charles A. E., Pojanard Sunirand, and Dmitrios P. Tsomocos. 2006. A model to analyse financial fragility. *Economic Theory* 27: 107–42. [CrossRef]
- Guillén, Mauro F. 2020. How businesses have successfully pivoted during the pandemic. In *Harvard Business Review*. Brighton: The United States of America. Available online: <https://hbr.org/2020/07/how-businesses-have-successfully-pivoted-during-the-pandemic> (accessed on 15 March 2021).
- International Monetary Fund Data. 2021. Available online: <https://www.imf.org/external/datamapper/datasets/WEO> (accessed on 20 February 2021).
- Jiang, Xsinfeng, Sihai Li, and Xianzhong Song. 2017. The mystery of zombie enterprises—“Stiff but deathless”. *China Journal of Accounting Research* 10: 341–57. [CrossRef]
- Jones, Stewart. 2017. Corporate bankruptcy prediction: A high dimensional analysis. *Review of Accounting Studies* 22: 1366–422.
- Kanno, Masyasu. 2021. Assessing the impact of COVID-19 on major industries in Japan: A dynamic conditional correlation approach. *Research in International Business and Finance* 58: 101488.
- Liang, Deron, Chia-Chi Lu, Chih-Fong Tsai, and Guan-An Shih. 2016. Financial ratios and corporate governance indicators in bankruptcy prediction: A comprehensive study. *European Journal of Operational Research* 252: 561–72.
- Lukason, Oliver, and Erkki K. Laitinen. 2019. Firm failure processes and components of failure risk: An analysis of European bankrupt firms. *Journal of Business Research* 98: 380–90. [CrossRef]
- Manning, Louise, Ian Birchmore, and Wyn Morris. 2020. Swans and elephants: A typology to capture the challenges of food supply chain risk assessment. *Trends in Food Science & Technology* 106: 288–97. [CrossRef]
- Mazur, Mieszko, Man Dang, and Miguel Vega. 2021. COVID-19 and the March 2020 Stock market crash. Evidence from S&P1500. *Finance Research Letters* 38: 101690.
- Ragin, Charles C. 1987. *The Comparative Method: Moving beyond Qualitative and Quantitative Strategies*. Berkeley: University of California Press.
- Ragin, Charles C. 1999. Using qualitative comparative analysis to study causal complexity. *Health Services Research* 34: 1225–39. [PubMed]
- Ragin, Charles C. 2000. *Fuzzy-Set Social Science*. Chicago: University of Chicago Press.
- Ragin, Charles C. 2006. Set relations in social research: Evaluating their consistency and coverage. *Political Analysis Advance Access* 14: 291–310. [CrossRef]
- Ragin, Charles C. 2008. Qualitative comparative analysis using fuzzy sets (fsQCA). In *Configurational Comparative Analysis*. Edited by Benoît Rihoux and Charles C. Ragin. Thousand Oaks and London: Sage Publications, pp. 87–121.
- Ragin, Charles C., and Sean Davey. 2014. *Fuzzy-Set/Qualitative Comparative Analysis 2.5*. Software Program. Irvine: Department of Sociology, University of California.
- Roubini, Nouriel, and Stephen Mihm. 2011. *Ekonomia Kryzysu [Economics of Crisis]*. Warsaw: A Wolters Kluwer Business Publishing House.
- Sakai, Yasuhiro. 2016. J. M. Keynes on probability versus F. H. Knight on uncertainty: Reflections on the miracle year of 1921. *Evolutionary and Institutional Economics Review* 13: 1–21. [CrossRef]
- Schumpeter, Joseph. 1942. *Capitalism, Socialism and Democracy*. New York: Harper Perennial.

- Sordi, Serena, and Alessandro Vercelli. 2006. Financial fragility and economic fluctuations. *Journal of Economic Behavior & Organization* 61: 543–61. [[CrossRef](#)]
- Vaisey, Stephen. 2009. QCA 3.0: The “Ragin revolution” continues. *Contemporary sociology. A Journal of Reviews* 38: 308.
- Woodside, Arch G. 2014. Embrace perform model: Complexity theory, contrarian case analysis, and multiple realities. *Journal of Business Research* 67: 2495–503. [[CrossRef](#)]
- Zelenkov, Yurii, and Nikita Volodarskiy. 2021. Bankruptcy prediction on the base of the unbalanced data using multi-objective selection of classifiers. *Expert Systems With Applications* 185: 115559. [[CrossRef](#)]
- Zelenkov, Yurii, Elena Fedorova, and Dmitry Chekrizov. 2017. Two-step classification method based on genetic algorithm for bankruptcy forecasting. *Expert Systems with Applications* 88: 393–401. [[CrossRef](#)]
- Zinecker, Marek, Karel Doubravský, Adam P. Balcerzak, Michał Bernard Pietrzak, and Mirko Dohnal. 2021. The COVID-19 disease and policy response to mitigate the economic impact in the EU. *Technological and Economic Development of Economy* 27: 742–62. [[CrossRef](#)]