Research Article

The Growth of Global Risks After the COVID-19 Pandemic

Efstratios Kypriotelis[1]* Georgios Kolias[2] Paraskevi Pappa[3]

[1]Lecturer, Department of Accounting and Finance, University of Ioannina, Ioannina, Greece
[2]Assistant Professor, Department of Accounting and Finance, University of Ioannina, Ioannina, Greece
[3]Lecturer, Department of Accounting and Finance, University of Ioannina, Ioannina, Greece

Abstract.
The 2006 Global Risks Report sounded the alarm on pandemics and health-related risks. Unsurprisingly, the global pandemic became a reality, and the immediate human and economic costs were affected. The efficiency of managing risks is accompanied by high levels of uncertainty, and the planning is unable to ensure accountability and yield reliable projections. This work aims to examine the complex system of risks and their interconnectivity with COVID-19 pandemic. Each risk itself may be considered a complex system that upon interaction with the global system of risks might be unstoppable and trigger a sequence of catastrophic events. This calls for a systematic examination of risks in a complex system to project the probability of risks becoming events, initiated by the COVID-19 pandemic. Risks have proliferated in recent years and the pandemic is an ascending factor. This paper analyzes the risks indicated by World Economic Forum, The Global Risk Reports from 2006 to 2022. We form our model by defining the risks associated with COVID-19 pandemic. The association between risks accelerating the probability of risk occurring, and increasing its impact. The most important elements are the virtually unheard factors produced in a fast-changing environment, which changes so fast because the system of factors is not a national or regional one, but the world functions uniformly. Informative and predictive functions under this reality does not provide information for the future, and the more important qualification of this information is uncertain unless the information from the past and the present has all the qualitative historical data, and the proportionate analysis is used. Dealing with risk under the development of a model would result in exclusion of certain factors or variants from this model, which could become a restricted perception and subject of imposing certain influential theories which demolished in conflict with reality. Risk events demonstrate the success and failure of risk management, which consistently point to poor planning as a major cause of risk management failure. This may be not the only reason for poor planning under conditions of high uncertainty. Furthermore, business is unaware of risk governance and lacks an understanding of risk situations, promoting individualism when governance necessitates broader participation. This lack of understanding or refusal of collective contribution is a societal malfunction and an avoidance of corporations' respective responsibilities in social welfare.

Keywords: COVID-19, global risks, economic crisis, risk management, governance

Corresponding Author: Efstratios Kypriotelis; email: kypriot@uoi.gr

Published: 1 February 2023

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the EBEEC Conference Committee.

jel CLASSIFICATION codes

F21, F22, F60

1. INTRODUCTION

Globalization is a complex and uncertain phenomenon. It is a complex phenomenon because its aspects are interrelated and although it is an irreversible movement towards global integration, it generates changes, effects, and unpredictable outcomes. Complexity and uncertainty are the result of the world's highly interconnected nature. In addition, the increasing speed of change, environmental and technological developments force onward political, economic, and social level uncertainties, projecting in political and social developments. Globalization run by a worldwide network for exchanging goods, information, new ideas, accelerates economic and social advancement, growth, and collaboration in unprecedented scale. At the same time, however, the underlying networks have created pathways along which dangerous and damaging events can spread rapidly and globally [13]. Risks arising locally or regionally and some of them, gradually or unexpectedly, eventually are becoming global. This has increased systematic risks affecting every sector of society. In the wake of various risks became events, the recent years, decision-makers are struggling to anticipate the upcoming global negative events with devastating consequences in the society. In view of worldwide perspective to understand inner qualities or interconnections of the risks, if any universally applicable capacity, function, or process of forming or understanding of global risks and their impact, risks must be considered as heterogeneous phenomena subverting future human optimism. In 2018 encouraging signs suggest that we have put the worst financial crisis of the post–World War II period behind us. Globally, people are enjoying the highest standards of living in human history [26]. The optimism for the upcoming year 2018, became pessimism two years later when the risk of global pandemic became reality. The alarm on pandemics sounded in 2006 GRR [24] and since then in every year report was present as an upcoming risk, but the humanity does not seem to be prepared for what had been alerted. The outburst of covid-19 pandemic was not the only event. A number of events such as the 2008-2009 "food crisis" the Ebola virus epidemic in West Africa; and the social, economic, and political repercussions of the European migrant "crisis" underline the importance of analyzing the dynamics and governance dimensions of so-called "globally networked risks" [12].

In this article, we discuss the interconnectedness in every local activity diffused through the complex systems that underpin our world, resulting from globalization.

Scholars have long debated the interdependence and complexity inherent in globalization [1, 5, 6, 9, 14]. Wilkinson et al, discuss about the complexity and how resilience is a property of complex systems [23]. Studies have been investigating the impact of each risk category on the global economy. A great number of them have been extensively search the risks' network. Lin, X., Moussawi, A., Korniss, G. *et al.*, developed a model to forecast interconnected global risks [17]; Rothstein, H., Huber, M., & Gaskell G., proposed a theory of risk colonization [19]. This discussion evinces a substantial challenge in risk management at all levels from corporate to state and global governance. In this perspective, we argue that the impact of harmful events will outbursts other events generating analogous impact or higher than usual through interconnectedness.

In the following section, we introduce, through a simplified model, to what degree the value of a risk is ascending from the state of individual risk, when the same risk blasts as an interconnected component of the complex system of risks. If so, what kind of global catastrophic risks might society face? In this article, we discuss the increasing interdependence of chosen carefully risks to covid-19 pandemic.

2. METHOD AND DATA

This paper extends preceded studies and insights based on a selection of literature on globally networked risks and provides additionally a subsequent analysis of the importance of incorporating multiple institutional management of risk sources and risk impact. Most risk analyses underestimate the impact of global risks ignoring that their interconnectivity enormously ascends their consequences [16]. The identification of global risks and their sources is particularly important of the study of their growing complexity. The World Economic Forum especially with the analysis of a complete systems in the examination of several risks, dissect them into parts. Appreciating the challenge to identify the risks, which if become an event will may spread rapidly and globally, identification and classification of the risks is the starting point of risk analysis. According to the Global Risk Reports (GRR), the global risks are divided in five major categories, economic, environmental, geopolitical, societal, and technological [28]. The above five categories comprise among others the most important and impactful global risks. Economic risks include among others: asset bubble burst in large economies, collapse of a systematically important industry, prolonged economic stagnation, financial and fiscal crises, high structural unemployment, energy price shock; environmental risks include: climate action failure, extreme weather events, natural catastrophes, human-made environmental damage; geopolitical category comprising:

interstate conflicts, collapse of a multilateral institution, fracture of interstate relations, state collapse, geopolitization of strategic resources, societal risk category comprising among others: collapse or lack of social security systems, food crises, water crisis, involuntary migration, profound social instability, pandemics, and technological risks comprising breakdown of critical information infrastructure, cyber-attacks, data fraud, misuse of technologies, failure of security governance etc. The process of risk naming is changing through the years and among researchers. The risks associated with this research are selected after consideration and recourse to the current research (OECD; Cambridge Global Risk Index 2019 Executive Summary, 2019; GRR, 2012-2022; United States National Research Council, 2012; United Nations, UNISDR, 2012) [4, 24, 25, 26, 27, 28]. Risks from GRRs were revised where applicable. When the usual process has been modified and/or expanded to reflect new ways in which the risks may materialize and the adverse outcomes that may cause, recourse to bibliography resolved the question.

For the purpose of this study, we identify the following ten risks and attribute accordingly the ensuing description for each one of them: Fiscal crises, Pandemics, Geopolitical conflict or regional conflict, Oil prices, Migration, Profound social instability or failure of national governance, Cyberattacks and data fraud, Failed states, Unemployment or labor market imbalances and Digital inequality. The selection was made on the basis of their appearances in GRRs the last seventeen years among the ten most likely risks to become an event and among the ten most impactful risk if they become event.

The structure of this survey is the following: First, define risks and create categories of main risks. Global risks are grouped in their five major categories to which they belong, according to WEF and OECD reports [27, 28]. A “global risk” is defined as an uncertain event or condition that, if it occurs, can cause significant negative impact for several countries or industries within the next 10 years. Second, for each of the selected risks we count their appearances between the ten top risks, in the GRRs, in terms of likelihood to become event. According to the number of appearances risks are chosen from the list of the global risks. Risk with zero appearance among the top ten risks were dismissed and the previous qualitative process of risk selection is modified. Third, consider the perceived likelihood to occur, in the next ten years the potential risks by year summarized in a table. Fourth, consider the perceived impact if a risk become an event, risks by year summarized in a table. Sixth, considering risks’ likelihood and impact if they become an event, we use a formula to assign arbitrary values to each individual risk. Although, this procedure assigns arbitrary values to risks, contributes very important results. This method enables us to classify risks based on their value, regardless of the given value. This arbitrary value is adequate to rank risks

according to their likelihood and impact combined. Seventh, we run step three, four, and six considering risks' interconnectedness.

We introduce a method of risk ranking according to their impact and likelihood, weighed by their appearances in GRRs. Being aware that global risks constitute a framework based on real facts while the framework of risks prediction is based on sources which are to be reliable and accurate, risk analysis has long been associated with predictions, affected by personal views, experience and experts' appraisal. Likewise, starting from the pandemics, when a risk appears in the past as a likelihood to become an event, other interconnected risks could be instigated. If these risks appear in our results, then these risks are interconnected with covid-19. The higher in our classification these risks are the higher their impact. If so, these risks should be considered. The systematic analysis of GRIR and the providing information put forward the development of the model under discussion, based on global information, characterized by increasing interdependency and interconnectivity.

3. RANKING GLOBAL RISKS: RESEARCH AND ANALYSIS

We structure our analysis based on previous work with the necessary improvements and changes [16]. As we elaborate in detail above, we consider and classified the following risks: 1) Oil prices, 2) Fiscal crises, 3) Pandemic, 4) Migration 5) Geopolitical conflict, 6) Unemployment, 7) Profound social instability 8) Failed states 9) Cyberattacks/data fraud and 10) Digital inequality. From our previous work we have excluded Physical disasters and we included technological risks which appear intensely the last ten years. The selection was made after intense scrutiny of the bibliography and institutional reports. Prominent contribution to the debate combines previous works on individual risks and their behavior [2], on systemic risks, emergence of global systemic risks [6], networked risks [13]. These contributions provide in depth understanding of risks substance, their interaction and global interdependencies, creation of networked risks which may become unpredictable and uncontrollable.

The analysis provides below is the result of interactive combination in the respective fields. These includes research on global and corporate governance, institutional regulation, and security. The main source of statistical information is the WEF's reports. We adjust the global risk reports as stated above, defining the most important risks. Although the risks and their names have been continually revised over the years, the risks' description as stated in our research provides adequate insight of their definition. Extracting the data from Global Risk Insight Report, hence GRIR, for the years 2006 –

2022 we count how many years each one of the risks appears in terms of likelihood to become an event [24, 25, 26, 27, 28]. Risks' selection is a very important task because we seek to identify and describe the risks which are the sources that may stimulate a train of catastrophic events in the context of the global system. Table 1, below present the results.

Table 1: Number of Risk Appearances for the years 2006 – 20022.

Risk	Appearances	first and last appearance
Pandemic	17	2006-2020
Fiscal crises	16	2006-2022
Geopolitical conflict or regional conflict	16	2007-2022
Oil prices	14	2006 -2020
Migration	13	2006-2020
Profound social instability or failure of national governance	12	2012-2022
Cyberattacks/data fraud	9	2012-2022
Failed states	8	2007-2020
Unemployment or labor market imbalances	7	2013-2019
Digital inequality	3	2020-2022

Unexpectedly (?), pandemics is the only global risk which appears every year since the first 2006 report. Pandemic appears also as "infectious diseases", which we consider, in global scale as the same risk. The name "infectious diseases" appears for the years (2011, 2021 and 2022). Likewise, oil prices appears as "energy price shock", "severe energy price shock" and we comprise in the same risk "asset price up" because there is a stable long-term relationship among energy price, industrial value adding, real interest rates, and stock price [8]; oil prices in general immediately react to changes in other financial assets and the behavior of oil as a financial asset – in that it immediately reflects information of other asset prices - was largely absent before the early 2000s. This change might be caused by the increased use of oil as a financial asset since then [11]. "Fiscal crises" appears in year 2019 as "debt crises", and in year 2020 as "asset bubble burst". Geopolitical conflict or regional conflict, depending on the year and the evincing geopolitical conditions and circumstances appears also as "UC/Iran conflict", "Middle East conflict". The number of appearances is a useful tool and indicates risk's selection and could be an equalizer in risk ranking, as in the final step of the analysis. Second, the GRIR, of the World Economic Forum provides tabular ranking for every risk in terms of likelihood and impact. Summarizing the results for all the years our attempt has been to synthesize advances in theory as well as the concentrated knowledge of risks experts. The aim is to focus on the basic risks from which catastrophic global

events can be developed by removing from the analysis other substances and keeping the basic elements of the complex risks system. That to avoid intuition, judicial decision was made on the available data, but the key point is the adherence on the substance which in advance requires reexamination from the future research.

The systematic analysis of GRIR and the providing information put forward the development of a model based on mechanism of the development of global risks and their interconnection [16]. This model will be used because it antecedently provided satisfactory results verified not far distant in time. The risks are assessed according to likelihood as it is provided by GRIRs. Consider the perceived likelihood to occur, in the next ten years the potential risks by year ranked in a table, taken the accenting values from 1 – 10 giving the score 1 to the less likely to become an event. Each of the risk in our study have been appeared among the top five global risks in terms of likelihood in GRIRs is getting a likelihood value according to its rank, on a scale from 1 to 10. The highest ranked risk is rated with a score of 10, giving the score 6 to the fifth. The risks not appeared between the 5 top risks in terms of likelihood in the GRIR, are rated with a score of 1. That is an arbitrary assignment of values to each risk. The purpose is not to assign a specific "true" value to each risk rather than to short them in a specific rank. Table 2 summarizes the results.

Table 2: Risks in Terms of Likelihood.

Risk/Year	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Pandemic	7	9	6	8	8	1	1	1	1	1	1	1	1	1	1	7	6
Fiscal crises	9	7	1	10	10	1	9	9	9	1	1	1	1	1	1	0	1
Geopolitical conflict or regional conflict	1	1	9	6	1	1	1	1	1	10	1	7	1	1	6	0	1
Oil prices	10	8	10	1	0	1	1	1	1	1	1	1	1	1	1	0	0
Migration	6	0	0	1	1	1	1	1	1	1	10	9	1	1	1	0	0
Profound social instability or failure of national governance (societal)	1	0	0	0	0	1	10	10	10	1	1	1	1	1	7	0	7
Cyberattacks/data fraud	0	10	0	0	0	0	7	0	6	1	0	6	8	7	0	1	1
Failed states	0	1	8	7	6	8	0	0	0	7	7	0	0	0	1	0	0
Unemployment or labor market imbalances	0	0	0	0	0	0	0	1	8	6	1	1	0	1	1	0	0
Digital inequality	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0

Risks assessed, accordingly in terms of impact of the individual risk on a scale of 1 to 10, 1 representing a minimal impact risk and 10 a catastrophic one. All five lower impact

risks valued with 1, 6 representing the fifth risk to the first up to the 10 representing the most impactful one. None of the selected risks in our research is the most impactful risk neither the second nor third one for the current year 2022. Profound social instability and Pandemics fill the pentad. Although it is not within the scope of this the pandemic crisis challenged international relations in ways that threaten lasting impacts, and the global economy has now sunk to its deepest crisis in peacetime [27]. The question arises about the perception of the understanding of large complex networks, with their components (risks), highly interconnected and densely entrenched, ready to explode when they are triggered from one or more of their components. This makes necessary a new simplified apparatus of analysis at a global scale. Moreover, the impact of disruptive events could be financially devastating for businesses and society. Table 3 summarizes the results.

Table 3: Risks in Terms of Impact.

Risk/Year	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Pandemic	6	7	6	7	7	1	1	1	1	9	1	1	1	1	1	10	1
Fiscal crises	9	10	10	10	10	10	10	10	10	1	1	1	1	1	1	0	1
Geopolitical conflict or regional conflict	1	9	9	1	1	8	1	7	1	8	9	10	10	10	9	8	1
Oil prices	8	6	7	8	8	6	6	1	1	1	6	1	1	1	1	0	1
Migration	1	1	1	1	1	1	1	1	1	1	7	1	1	1	1	0	1
Profound social instability or failure of national governance	7	0	0	0	0	0	1	1	1	10	8	8	6	7	6	6	6
Cyberattacks/ data fraud	0	1	0	0	0	0	1	1	6	1	1	1	1	1	1	1	0
Failed states	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
Unemployment or labor market imbalances	0	0	0	0	0	0	1	1	7	1	1	1	1	1	1	0	0
Digital inequality	0	0	0	0	0	0	0	1	1	1	0	0	1	1	1	1	0

Finally, assessing and addressing these risks, a formula would make these data accessible for the simplicity of their substance. The absence of any central coordinating mechanism of governance process [7] requires the construction of a complex model. In the case of risks and their sources a complex mode may involves political decision and act and many times conflicting information could cause deviations from the original scope. For example, according to Blinder, referring in the financial crisis of 2007 – 2008, the complexity of the system is also evident in the inability of policy makers and academics to arrive at a consensus over a single causal explanation for the crisis, with one best-selling book strongly arguing that as many as seven causal factors and

processes necessarily contributed to the crisis and that no single factor or process was causally sufficient [3]. We are trying to put the more information aside and simplify the data following Helbing's, suggestion that, hence too much information may create a more opaque rather than a more transparent picture [13]. Therefore, following the tabular method, the potential risks ranked accordingly as estimated from year 2006 to 2022, in terms of likelihood and impact. To explore the impact relative to the likelihood of risk event, by category, the following condition applied [16]:

$$r, i = \int_{n=1}^{N} probability_{i,n} \cdot \int_{n=1}^{N} impact_{i,n}/N$$

Where Vr,i is Value for risk i, [probability]_(i,n) and [impact]_(i,n) are respectively the likelihood and impact assigned to risk i for every year n from year 1 to year N. N is the total number of years. Equation gives the value of risk as it perceived in terms of likelihood and impact for each given year for a fifteen-year period, from 2006 to 2022. This internal value does not represent any real size either as a possibility or as a monetary value but is an indicator for the perceiving trends of risk over the given fifteen years' period. Although, this procedure assigns arbitrary values to risks, contributes very important results. This method enables us to classify risks based on their value, regardless of the given value. Table 4 provides this ranking.

Table 4: Risks Ranking.

Rakn	Risk	Value
1	Fiscal crises	25.41
2	Geopolitical conflict or regional conflict	18.56
3	Profound social instability or failure of national governance (societal)	16.75
4	Pandemic	13.09
5	Oil prices	10.32
6	Failed states	4.96
7	Cyberattacks/data fraud	4.92
8	Migration	3.48
9	Unemployment or labor market imbalances	2.39
10	Digital inequality	0.41

We define the global risks through the individual behaviors of their components without any interconnection between them. The value assigned to each risk is meaningless, defining exclusively the ranking of the global risks. Fiscal crisis sits at the top of the hierarchy of values, followed by Geopolitical conflict, Social instability, Pandemic and Oil prices conclude the five most considerable risks. The risks considered high impact and high probability to become an event are mostly from three categories, economic,

societal, and geopolitical. Each individual risk may be the cause of moderate and controllable results if act alone but this same risk as a component of risks system, when become an event, may trigger cascading, unpredictable and uncontrollable effects. The global system of interactions requires a shift in our analysis or interdependence.

3.1. Exploring the links between globally interconnected risks

Social phenomena are interconnected, and the undeniable existence of this link is to explain the relevance of all the social achievements as calculation measures to the development of society. Dominant academic approaches in this growing research domain seriously underestimate the fundamental role that, for example, international institutions and networks of various kinds play in the international community's ability to mitigate, detect, and respond to these risks [12]. While increasing the interconnectivity between infrastructure systems can result in a higher efficiency of service, it also makes the constituent systems vulnerable as a whole to cascading failures [21]. Niu et al. [18], using data from GRIR from 2013 to 2017 and a Cascading Alternating Renewal Process approach to model the dynamics of the global risk network, demonstrate the evolution of this network and support that the influence among risks changes significantly over the years. The risks listed in the GRIR constitute the system of global risks. The system of global risks has among other two properties, which are significant in our analysis. First, the risks constantly change, new risks emerge, either unexpectedly encounter as highly likelihood and impact risks or they appear spatially with low likelihood and impact, raising slowly to huge catastrophes when they become events. Other risks are a continuous threat and others decline and are removed from the system. Second, when a risk becomes an event, it generates other risk interconnected with, changing their materialization likelihood and/or their impact. This second property indicates that generated risks are more powerful and more impactful than the same risks act separated. Hebling, described how system components, even if their behaviour is harmless and predictable when separated, can create unpredictable and uncontrollable systemic risks when tightly coupled together [13]. Nevertheless, the global risk network could be examined as a stable system, but the two properties of the system impose the requirement for a dynamic examination. We therefore juxtapose our findings and the findings of three different sources. These sources provide models, and predictions of risk network evolution and risk interconnection.

Spreading of emergent epidemics is largely a result of global air traffic, and may have serious impacts on our global health, Social and Economic systems [10, 13, 22]. Risks are

characterized by heterogeneous components, and they are themselves heterogeneous components of the risk system. The outcome of the interaction between the components of a complex system is uncertain and the contribution of each component to the outcome cannot be specified. That to use existing theories to provide much practical advice on which risks would be generated when another interconnected risk of the system become an event is a significant gambit which decision-makers could gain a better understanding of risks management. From 2022, economic, geopolitical, public health and societal fractures – which increase after pandemics – risk leading to divergent and delayed approaches to critical challenges facing people and planet [28].

Defining risks' interconnections requires qualitative and quantitative approach to incorporate a minimal error outcome [15]. The covid-19 pandemic is not an isolated risk but affect and amplify other risks through negative feedback. In the GRRs from 2006 – 2022 for each of the risks ranked most severe we select the risks that will be aggravated by pandemics. A simple list of interconnected, with pandemics for every year from 2006 to 2022, was reckoned. According to GRR of 2022 [28], a simple tally of the number of times a risk was identified as being aggravated by another for each of the most, second-, third-, fourth- and fifth-most severe risks was calculated on this basis. The thickness of each of the links between a risk and the risks being aggravated is scaled according to the above tally. Primarily, the outcome allows us to incorporate feedback as a source of interconnectivity. Supplementary, we consider necessary to exploit bibliography concerning risks interconnection to amend the original list. Therefore, at that point insignificant corrections were made, because per contra, original information balanced with bibliography findings. Although, there are important limitations inhibiting this work to provide accurate outcome, we strongly suggest that the risks' ranking, according to this model, could help to mobilize the collective effort against specific risks, focusing on the systemic risks interconnected with covid-19 pandemic. The table 5 summarizes the results, providing the risks interconnected with pandemics for every year from 2006 to 2022.

Furthermore, the combination of risks interconnections systematic research and the analysis of the data, based on a methodology comparable to statistical cluster analysis, alternated the ranking of the risks and proliferated their value of each individual risk. The value assigned to each interconnected with pandemic risk is arbitrary, but it is comparable to the value of the same individual risk. For example, profound social instability was ranked third with a value of 16.75 as an individual risk and ascended first with a value of 368.50 as interconnected with the pandemic risk; accordingly fiscal crisis descended from the first rank to the second, with an ascending value from 25.41

Table 5: Pandemic – Risks interconnections.

Year	Risk							
2006	Global trade	Assets prices		Social instability		Migration		
2007	Geopolitical conflict		Asset prices	Oil price	World disease		Fiscal crises	
2008	Oil prices	Fiscal crises						
2009	Food prices	Fiscal crises	Infectious diseases		Institutions failure			
2010	Global governance gaps		Infectious diseases		Migration			
2011	Migration	Global governance failure						
2012								
2013								
2014	Mismanaged urbanization							
2015	Food crises	Water crises	Failure of national governance	State collapse or crisis	Migration	Critical information breakdown	Profound social instability	
2016	Food crises	Water crises	Profound social instability	Migration	Failure of critical infrastructure (econ)	Adverse technological advances		
2017	Food crises	Water crises	Failure of national governance			Migration		
2018	Profound social instability		Inflation	Interstate conflict		Failure of regional or global governance		
2019	Water crises	Interstate conflict		Failure of regional or global governance				
2020	Food crises	Water crises	Social instability		Global governance failure			
2021	Economic disruption	Economic Shock wave	Unemployme	Geopolitica tensions	Digital division	Social cohesion	Next pandemic	Social instability
2022	Global division	Fiscal crises	Unemployme	Geopolitica tensions	Cyberattacks/da fraud	Profound social instability		

to 228.71; geopolitical conflict descended third from second rank, with and ascending value from 18.56 to 92.78; pandemic retained the fourth rank with an ascending value from 13.09 to 52.35. Oil prices concluded the pentad of the most likely to become an event risks and the most impactful if they become an event. The table 6 summarizes the results.

4. CONCLUSION

To summarize, in this paper we introduce a model of obtaining a qualitative and quantitative conception of global risk interconnection, focusing, as an initiating factor, on covid-19 pandemic. We propose insights to understand the change of inner quality of the individual global risk, even if its likelihood and impact is predictable and understandable, when this same risk emerges interconnected within the complex system of risks. In the context of determination of each risk, we discover that each risk changes in quantity and quality when diffuses in the international environment and becomes global. As we have

Table 6: Risks Ranking (Pandemic – Risks interconnections).

Rakn	Risk	Value of individual risk	Value of interconnected risk	multiplier
1	Profound social instability or failure of national governance (societal)	16.75	368.50	22
2	Fiscal crises	25.41	228.71	9
3	Geopolitical conflict or regional conflict	18.56	92.78	5
4	Pandemic	13.09	52.35	4
5	Oil prices	10.32	51.62	5
6	Failed states	4.96	49.63	10
7	Migration	3.48	20.90	6
8	Cyberattacks/data fraud	4.92	9.83	2
9	Unemployment or labour market imbalances	2.39	4.79	2
10	Digital inequality	0.41	0.82	2

discussed in this study, there are considerable advances in understanding global risks. Estimates for the likelihood a risk to become an event attributed to this risk a specific probability, produce efficient results. Realist models begin from the assumption that it is possible to probabilistically assess the likelihood and impact of any specified risk given its inherent characteristics [20]. Considering that many challenges for risk governance involve socioeconomic assumptions we need interdisciplinary approach to understand the function of interconnected systems in the global environment. The data generated by various risk reports provide adequate information individual risks and certainly about their interconnection. We attempted to perform this information and to come out with the ranking of risks elaborating their three elements, likelihood, impact, and the number of their significant interconnections for a given period of years. The result is a ranking table providing hierarchically what risks could be generated if a specific risk becomes an event.

As a consequence, covid-19 pandemic “will” or could initiate profound social instability, fiscal crisis, geopolitical conflict and another pandemic. Moreover, these risks have been already indicated by risks reports, but according to the above ranking table, covid-19 pandemic ascended the probability to become events and proliferated their impact. Covid-19 pandemic establishes the possibility of cascading global catastrophic events. The deficiency of global cooperation calls for a strong effort at the level of corporate and global governance. Our results, therefore, point the importance of risks

are interconnection, consistently with the results of other risk analyses. The Covid-19 crisis is going to increase even more the need of international intervention in risk prevention and hence to make risk management a much more serious concern.

ACKNOWLEDGEMENT

In memory of our fellow worker, Dr. Nilolaos Arnis.

References

[1] Beck U. What is globalization? Cambridge, UK: Polity Press; 2009.

[2] Beck U. World risk society. Cambridge, UK: Polity; 1999.

[3] Blinder AS. After the music stopped: The financial crisis, the response, and the work ahead. New York: Penguin; 2013.

[4] Cambridge Centre for Risk Studies. Global Risk Index 2019 Executive Summary. Cambridge, UK: Cambridge Centre for Risk Studies, University of Cambridge; 2018.

[5] Centeno MA, Cohen JN. Global capitalism: A sociological perspective. Cambridge, UK: Polity; 2010.

[6] Centeno MA, Cohen JN. The arc of neoliberalism. Annual Review of Sociology. 2012;38:317–340.

[7] Centeno MA, et al. The emergence of global systemic risk. Annual Review of Sociology. 2015;41:65–85.

[8] Rong-Gang Cong R-G, Shen S. Relationships among energy price shocks, stock market, and the macroeconomy: Evidence from China. The Scientific World Journal. 2013;2013:171868. https://doi.org/10.1155/2013/171868

[9] Dionne G. Risk management: History, definition, and critique. Risk Management and Insurance Review. 2013;16(2):147–166.

[10] Epstein JM. Modelling to contain pandemics. Nature. 2009;460:687

[11] Fratzscher M, Schneider D, Robays IV. Oil prices, exchange rates and asset prices. ECB Working Paper Series. Frankfurt, Germany: European Central Bank; 2014.

[12] Galaz V, Tallberg J, Boin A, Ituarte-Lima C, Hey E, Olsson P, et al. Global governance dimensions of globally networked risks: The state of the art in social science research. Risk, Hazards & Crisis in Public Policy. 2017;8(1):4–27

[13] Helbing D. Globally networked risks and how to respond. Nature. 2013;497(7447):51–59.

[14] Held D, McGrew AG, editors. Globalization theory: Approaches and controversies. Cambridge, UK: Polity; 2007.

[15] Kypriotelis E, Arnis N, Kolias G. Global, regional and local perspectives on the economies of southeastern Europe. Springer Proceedings in Business and Economics. Horobet A, Belascu L, Polychronidou P, Karasavvoglou A, editors. Cham: Springer; 2021. Qualitative criteria and the performance of the global economy.

[16] Kypriotelils, et al . Global risks and their impact on the economy of Balkan countries. EBEEC Conference proceedings, Opatija, Croatia; 2020.

[17] Lin X, Moussawi A, Korniss G, Bakdash JZ, Szymanski BK. Limits of risk predictability in a cascading alternating renewal process model. Scientific Report. 2017;7:6699.

[18] Niu X, Moussawi A, Korniss G, Szymanski BK. Evolution of treats in the global risk network. Applied Network Science. 2018;3:24.

[19] Rothstein H, Huber M, Gaskell G. A theory of risk colonization: The spiralling regulatory logics of societal and institutional risk. Economy and Society. 2006;35(1):91–112.

[20] Slovic P, Fischhoff B, Lichtenstein S. Rating the risks. Environment: Science and Policy for Sustainable Development. 1979;21(3):14–39.

[21] Szymanski B, Lin X, Asztalos A, Sreenivasan S. Failure dynamics of the global risk network. Scientific Reports. 2015;5:10998.

[22] Vespignani A. The fragility of interdependency. Nature. 2010;464:984–985.

[23] Wilkinson A, Kupers R, Mangalagiud D. How plausibility-based scenario practices are grappling with complexity to appreciate and address 21st century challenges. Technological Forecasting and Social Change. 2013;80(4):699–710.

[24] World Economic Forum. Global risks report 2006. 1st ed. Available from: http://www3.weforum.org/docs/WEF_GlobalRisks_Report_2006.pdf

[25] World Economic Forum. Global risks report 2018. 13th ed. Available from: http://www3.weforum.org/docs/WEF_GlobalRisks_Report_2012.pdf

[26] World Economic Forum. Global risks report 2018. 13th ed. Available from: http://www3.weforum.org/docs/WEF_GlobalRisks_Report_2018.pdf

[27] World Economic Forum. Global risks report 2021. 16th ed. Available from: http://www3.weforum.org/docs/WEF_GlobalRisks_Report_2021.pdf

[28] World Economic Forum. Global risks report 2022. 17th ed. Available from: http://www3.weforum.org/docs/WEF_GlobalRisks_Report_2022.pdf