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LEADERSHIP, INNOVATION, MANAGEMENT AND ECONOMICS:
INTEGRATED POLITICS OF RESEARCH

LIMEN 2022

EXE Budapest Center, Budapest, Hungary
December 1, 2022 (hybrid)

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LIMEN 2022

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Preface

Organizing is an evolutionary phenomenon, distinctive because of the laws of existence and maintaining all structures in all processes of their functioning. As such, it is a civilizational phenomenon that occurs as a component of human, individual, and social activities and as a factor in the overall development of man and society. On the other hand, as a deliberate human activity, organizing involves seeking solutions to problems that occur on the way to achieving specific goals. No goal can be achieved without appropriate or necessary, or at least minimal organization of conditions, factors, and processes needed for goal achievement. However, the new era requires new types of leaders and managers and new forms of organization; demands those who are willing and able to lead the company/corporation/state, in a distinct competitive environment, with all the good and bad sides brought by the globalization of world economy.

The purpose of the annual LIMEN conference is to support the power of scientific research and dissemination of the research results with the objective to enhance society by advancing knowledge; policy-making change, lives, and ultimately, the world. Our objective is to continue to be the foremost annual conference on cutting-edge theory and practice of leadership, innovations, management, and economics, encouraging advancement via excellence, and interaction.

LIMEN conference aims to bring together the international academic community (experts, scientists, engineers, researchers, students, and others) and enable interactive discussions and other forms of interpersonal exchange of experiences and popularization of science and personal and collective affirmation.

The annual LIMEN conference is committed to the highest standards of publishing integrity and academic honesty ensuring ethics in all its publications. Conformance to standards of ethical behavior is therefore expected of all parties involved: authors, editors, reviewers, and the publisher. The conference organizer follows the Committee on Publication Ethics (COPE) guidelines on how to deal with potential acts of misconduct.

All received full papers prior peer review process are subject to plagiarism check with iThenticate by Turnitin software. Any identified plagiarism automatically disqualifies a paper. Afterward, all full papers are double-blind peer-reviewed by the reviewers drawn from the editorial committee or external reviewers depending on the topic, title, and subject matter of the paper. Peer reviewers provide a critical assessment of the paper and may recommend improvements. Although the author may choose not to take this advice, we highly recommend that the author address any issues, explaining why their research process or conclusions are correct.

Association of Economists and Managers of the Balkans headquartered in Belgrade – Serbia along with the partner institutions, namely the Center for Advanced Studies in Management and Economics (CEFAGE-UE), Institute for Advanced Studies and Research, University of Evora, Portugal; Department of Law, Economics and Sociology, University of Magna Graecia, Catanzaro, Italy; Faculty of Economics, University of South Bohemia, České Budějovice, Czech Republic; and Rio de Janeiro Institute College (Faculdade Instituto Rio de Janeiro – FIURJ), Rio de Janeiro, Brazil organized 8th International Scientific-Business Conference titled: Leadership, Innovation, Management, and Economics: Integrated Politics of Research – LIMEN 2022 on December 1, 2022 in the EXE Budapest Center, Budapest, Hungary in a hybrid format (in-person, online and virtually).

LIMEN 2022 covered a wide array of topics related to economics, finance, technology, and social issues. It delved into areas such as economic growth, cryptocurrency markets, globalization, artificial intelligence, financial market efficiency, sustainability, pandemic impacts, management practices, tourism, environmental concerns, and legal challenges. The 8th LIMEN conference explored economic theories, market trends, social behaviors, and technological advancements, providing a comprehensive overview of various facets of contemporary global issues.

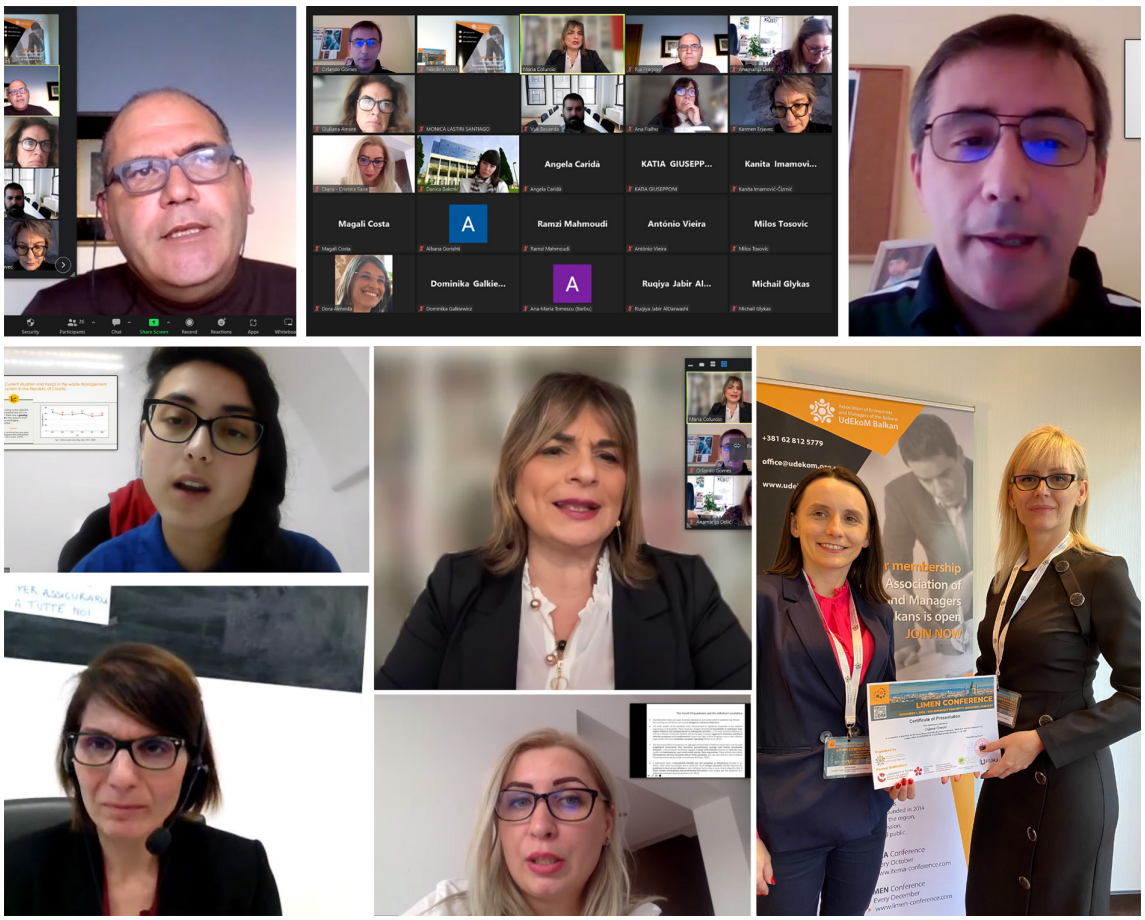
The keynote speaker at the LIMEN 2022 conference was professor Orlando Gomes representing Lisbon Accounting and Business School (ISCAL-CEFAGE), Portugal with the topic "*Global risks and the theory of economic growth*".

Within publications from the LIMEN 2022 conference:

- 10 double peer-reviewed papers have been published in the **LIMEN 2022 Selected Papers**,
- 39 double peer-reviewed papers have been published in the **LIMEN 2022 Conference Proceedings,**
- 61 abstracts have been published in the **LIMEN 2022 Book of Abstracts**.

Altogether LIMEN 2022 publications have nearly 600 pages. All full papers have DOI numbers and ORCID iD integration.

Participation in the conference took **more than 100 researchers** representing **21 different countries** from different universities, eminent faculties, scientific institutes, colleges, various ministries, local governments, public and private enterprises, multinational companies, associations, etc.



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Global Risks and the Theory of Economic Growth

Orlando Gomes[1]

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Abstract: *Although global risks may be sorted into different categories – economic, environmental, geopolitical, societal, and technological – they are strongly intertwined and they tend to reinforce one another, easily transforming a localized problem into a perfect storm capable of deeply affecting all economic sectors and all aspects of people's lives. This short essay undertakes a systematic and integrated discussion of global risks in the context of economic growth theory. A standard endogenous growth (SEG) model is adapted and reconfigured into a global risk endogenous growth (GREG) model.*

1. INTRODUCTION

Contemporaneous economic growth models, devised over the last couple of decades, follow in the steps of the ground-breaking contributions of the twentieth century, namely those by Solow (1956), Romer (1986), Lucas (1988), and Aghion and Howitt (1992), among others. To the original contributions, recent research has appended new insights, mostly about innovation and the creation of knowledge. Innovation is approached through the lens of creative destruction processes that firms undertake to enhance productivity (Acemoglu et al., 2018, 2022; Aghion et al., 2016; Akcigit et al., 2016, 2021; Akcigit and Kerr, 2018; Grossman & Helpman, 2018); creation of knowledge is interpreted as a process of propagation of ideas that requires social interaction (Lucas, 2009; Lucas & Moll, 2014; Perla & Tonetti, 2014).

The above-cited literature, paradigmatic of the current state of growth theory, implicitly adopts an optimistic view of growth. Under this perspective, sustained growth is the inevitable outcome of the ability of people to organize themselves into groups (firms and institutions) that share a common goal (increased material wealth and well-being) and that will work together to attain such a goal. A mix of market competition and efficient bureaucracies make the path to prosperity the only conceivable outcome of most of the growth paradigms offered by research in economics. Notwithstanding, reality tends to contradict such an optimistic view, a view that overlooks the many potential dangers, obstacles, conflicts, and challenges, that economies face, namely when taking into consideration the global panorama they integrate, in which they participate, and in which they contribute.

In this short essay, growth is looked upon from the perspective of global risks. Global risks are a series of exogenous forces that may condition the decisions of economic agents and that, ultimately, are prone to hamper economic growth in a more or less significant way. Global risks will

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be attached to an endogenous growth model, in order to discuss how the lack of care in dealing with global common goods may lead to significant disruptions in the ability of individual countries in securing growth rates compatible with their effort in organizing production and creating the right environment to increase the quality of their inputs.

To assess global risks, this study relies on the global risks reports, published every year by the World Economic Forum (2006-2022). This publication undertakes a thorough and insightful evaluation and discussion about the main risks faced by the world economy and how these risks can be counteracted by the action of those notoriously recognized as being the decision-makers (governments, institutions, firms, and individuals) with the greatest power and influence in the world.

The mentioned reports separate global risks into five categories, namely economic, environmental, geopolitical, societal, and technological risks. Although they have distinctive features, in most cases the risks in the five categories are intertwined, and they cannot be fully perceived and understood unless one takes an integrated view of them. A global crisis may likely erupt from a single event (some *seed of dystopia*); however, there is a strong chance that this event suddenly spreads over other areas of the economy and society, leading to a *perfect storm* that will deeply and pervasively affect all sectors of economic activity and all aspects of people's lives.

The analysis and discussion of global risks are not completely absent from growth theory. In the past, several studies have approached the influence of risks about some of the above-highlighted categories over the ability of economies to increase living standards [see, e.g., the work of William Nordhaus on environmental risks (Nordhaus, 2015, 2019), and the work of Daron Acemoglu and his co-authors on geopolitical and technological risks (Acemoglu, 2005; Acemoglu & Robinson, 2008; Acemoglu & Yared, 2010; Acemoglu et al., 2012, 2017, 2019). However, an integrated view of global risks and growth theory is still missing in the literature. This paper points in this direction, by associating the various classes of risks to a single endogenous growth model.

The remainder of the manuscript is organized as follows. Section 2 introduces global risks, by briefly surveying the contents of the global risks reports. Section 3 recovers the standard endogenous growth model, which is transformed, in Section 4, into a global risks endogenous growth model by appending each of the five categories of risks to the planning problem of the representative agent of the national economy. Section 5 concludes.

2. THE GLOBAL RISKS REPORT: AN OVERVIEW

The World Economic Forum, an independent international organization that congregates political, business, and other leaders to reflect upon the state of the world, publishes every year, since 2006, the *Global Risks Report*. This publication identifies, discusses, and proposes solutions to mitigate the most relevant and pressing risks faced by humankind. The report defines global risk as "the possibility of the occurrence of an event or condition that, if it occurs, could cause a significant negative impact for several countries or industries (…) over the next 10 years." (World Economic Forum, 2022 Report, page 93). The identified risks are classified as belonging to one of five categories: economic, environmental, geopolitical, societal, and technological.

On the economic front, the latest issues of the report highlight the following risks: asset bubbles, the collapse of important industries, debt crises in large economies, inability to control inflation, the proliferation of illicit activity (organized crime, illicit trade, tax evasion), economic stagnation

and recessions, and commodity shocks. Regarding the environment, the concern resides essentially in the incapacity to control and revert climate change and other possible environmental setbacks, such as biodiversity loss, extreme weather events, human-made environmental damages, geophysical disasters, and overexploitation and mismanagement of critical natural resources.

The geopolitical risks include interstate conflicts, the collapse of nation-states, terrorism, the threat posed by weapons of mass destruction, the collapse of multilateral institutions, and geoeconomic and geopolitical confrontations. On the societal category, a vast array of risks can be listed, which include the erosion of social cohesion, the hypothetical failure of public institutions and social security systems, the deterioration of working conditions and job opportunities, large-scale involuntary migrations, youth disillusionment, and health-related risks including the spread of infectious diseases (epidemics and pandemics). Finally, from the technology perspective, fundamental risks are associated with digital inequality and digital power concentration, failures in regulating and governing technology, adverse outcomes of technological advances, breakdown of critical information infrastructures, and cybercrime.

The items enumerated in the two previous paragraphs constitute a comprehensive list of the risks that pose the most significant danger for economies and societies today and in the near future. The perception of these risks has evolved, as documented in the reports. While the first editions of the Report concentrated attention on some of the topics of primary concern at the time, such as terrorist attacks, oil price spikes, and the global financial crisis, other topics gradually or suddenly emerged at the top of the agenda of the global worries. Over the last decade, climate change, increasing income and wealth inequality, signs of retrenchment from globalization, and cybersecurity concerns, progressively came into the spotlight. Other risks became, as well, as the result of particular events, the center of attention, namely the worldwide spread of infectious diseases and the disruption of the existing geopolitical world order.

A fundamental point to make about global risks is the recognition that they are strongly interconnected, not only within the mentioned categories but in many ways also across categories. For example, a geopolitical world conflict necessarily implies a disruption of business supply chains and, therefore, exacerbates a series of interconnected economic risks; evidently, such a conflict is also detrimental to the societal dimension, because resources that could be allocated to improve life in society are diverted to the war effort. Conflict and destruction are also necessarily harmful to the environment. From a technological perspective, one should remark that modern warfare is also a cyber war, which can be extremely damaging for the digital systems on which contemporaneous societies rely upon.

In the above paragraph, the *seed of dystopia* (a term often used in the reports), was attributed to geopolitical conflict. However, it can also be placed elsewhere with pretty much the same outcome. Take, for instance, the Covid pandemic. Initially a societal issue, its implications rapidly spread to the economy (with an increased risk of inequality and poverty) and to technology (with the fast growth of digital dependency). The social unrest emerging from the containment measures also had strong political implications. Another potential seed of a catastrophic chain of events may come from climate change. The economic, political, and societal implications of higher environmental risk are obvious, and they are already being felt in every economy.

Although in many respects the world has shown resilience in avoiding and fighting existential threats (as in the case of the Covid pandemic), there is always the danger of a *perfect storm*, i.e.,

of a series of unfortunate events coming together to trigger a catastrophic and highly destructive outcome, that eventually culminates in a civilizational regress. In the last few centuries, humanity has witnessed a systematic and ever-increasing improvement in living standards and quality of life. In statistical terms, this is easily confirmed, by looking at the GDP growth series. However, despite the wonders of technology that are available today and that are the fruit of many years of sustained growth, there are no guarantees that we will continue on the path of prosperity. Some of the mentioned risks are human-made, while others are, at least partially, outside the direct control of human action. Anyway, the possibility of a dark combination of some of them is today more probable than ever (because the underlying realities are also increasingly complex) and cannot be ignored (or avoided).

Besides enumerating risks, the *Global Risks Report* also offers in-depth discussions on the possible paths to mitigate them and to create mechanisms, at the global and national levels, to cope with large-scale threats. One should acknowledge that global risks are associated with what economists designate as public goods, i.e., common resources that are available to everyone and that require collective regulation and management. This is the case for many of the items mentioned above, from the environment to international security and digital networks.

3. THE NO-RISK SCENARIO (SEG MODEL)

In this section, a standard endogenous growth (SEG) model is presented. The framework constitutes the basis upon which the impact of global risks will be addressed afterward.

Assume a representative agent, who solves a typical optimal control problem, which consists of the maximization of intertemporal utility, defined as

$$U(0) = \int_0^{+\infty} e^{-(\rho-n)t} u[c(t)]dt \tag{1}$$

In expression (1), $c(t) \geq 0$ represents *per capita* consumption, and parameters $\rho \geq 0$ and $n \geq 0$ define, respectively, the rate of time preference and the population growth rate. The instantaneous utility function, $u(.)$, obeys trivial properties of continuity, differentiability, and concavity; in particular, a constant intertemporal elasticity of substitution (CIES) utility function is assumed, with the elasticity of intertemporal substitution of consumption equal to $1/\theta$, $\theta > 0$.

The maximization of (1) is subject to a series of constraints that characterize the accumulation of factors of production. For the sake of the current analysis, three constraints are assumed, which characterize the dynamics of physical capital, human capital, and technology. Start by considering the following differential equation, representative of the process of physical capital accumulation,

$$\dot{k}(t) = f[a(t)k(t), h(t)u(t)] - c(t) - (n+\delta)k(t), \qquad k(0) = k_0 \text{ given} \tag{2}$$

In equation (2), $k(t) \geq 0$ represents the *per capita* stock of physical capital. The other variables are a technology index, $a(t) \geq 0$, a measure of the efficiency of labor (i.e., a human capital variable), $h(t) \geq 0$, and the share of labor allocated to the production of physical goods, $u(t) \in (0,1)$. Parameter $\delta \in (0,1)$ defines the rate of depreciation of capital. Observe that the technology variable $a(t)$ is directly associated with the productivity of capital and, therefore, it can be interpreted as a synthesis of the outcome of radical and incremental innovations that eventually take

place under a process of creative destruction. In the particular case of the proposed model, this variable is attached to a catching-up process relative to the world's technology frontier.

The production function in equation (2) is a typical neoclassical production function that exhibits constant returns to scale and diminishing marginal returns for each input. The tractability of the model requires taking a specific functional form; the most common functional form is a Cobb-Douglas production function with $\alpha \in (0,1)$ defining the output-capital elasticity.

The equation of motion for the labor efficiency variable is expressed as follows,

$$\dot{h}(t) = g[1 - u(t)]h(t) - \delta_h h(t), \qquad h(0) = h_0 \text{ given} \tag{3}$$

The production function of human capital is subject to constant marginal returns, with the productivity of the education sector $g > 0$. The term $1 - u(t)$ corresponds to the share of human capital allocated to the generation of additional human capital, and $\delta_h \in (0,1)$ is the rate of obsolescence of this capital input.

Regarding technology, a simple mechanism of convergence to the world technology frontier is adopted. Let $A(t)$ represent the world technology frontier and let this grow at a constant rate γ,

$$\dot{A}(t) = \gamma A(t), \qquad A(0) = A_0 \text{ given} \tag{4}$$

The dynamics of the national technology variable is given by the differential equation

$$\dot{a}(t) = \hat{a}\left[1 - \frac{a(t)}{A(t)}\right]a(t), \qquad a(0) = a_0 \text{ given} \tag{5}$$

Equation (5) characterizes the process of convergence in the direction of $A(t)$; the further away $a(t)$ is from the world frontier, the faster will be the convergence.

The SEG model is defined as the maximization of (1) subject to (2), (3), and (5), given the exogenous growth rate of the world's technology frontier, (4). The control variables of this planning problem are c(t) and $u(t)$, and the state variables are the remaining three endogenous variables, namely $k(t)$, $h(t)$, and $a(t)$. The dynamic model can be solved by resorting to standard optimal control techniques. The outcome is a balanced growth path (BGP) in which variables $c(t)$, $k(t)$, $h(t)$, and $a(t)$, all grow at constant rates. Income, $y(t) = f(.)$, will also grow at a constant rate which is, given the specification of the model,

$$\frac{\dot{y}}{y} = \frac{1}{\theta}\left[g - \delta_h - (\rho - n) + \frac{\alpha}{1-\alpha}\gamma\right] \tag{6}$$

Expression (6) highlights the role of the productivity of the human capital sector (g) and of the rate of innovation at a global level (γ) as the main drivers of growth in this simple model of economic growth.

4. RISK PERVASIVENESS (GREG MODEL)

As characterized, the SEG model considers no global risk endangering the nation's ability to absorb technology, accumulate knowledge, and grow. In this section, five global risks are attached to the SEG model, each one of them associated with one of the five risk categories highlighted

in the World Economic Forum reports. The SEG model is, under this perspective, transformed into a global risks endogenous growth (GREG) model.

The first set of risks to consider is those of an economic nature. In the context of the proposed setting, economic risks are illustrated through their potential impact on the aptitude of the world's economy to continue to innovate at a given risk-free pace. The prospect of economic imbalances (e.g., extreme income inequality, high unemployment, financial instability, illicit trade) constitutes a threat to the innovation capabilities of the world economy and, therefore, simply and straightforwardly, economic risks are circumscribed to the international dimension and attached, in the GREG model, to a potentially lower global innovation rate than the one considered in equation (4). Analytically, equation (4) is adapted to become

$$\dot{A}(t) = \left[\gamma - \frac{\dot{x}(t)}{x(t)}\right] A(t) \tag{7}$$

In expression (7), variable $x(t) \geq 0$ synthesizes the economic threats over the expansion of the world's technology frontier. As modelled, the higher the rate at which economic risks increase, the lower will be the growth rate of the technology frontier, relative to the benchmark case. If economic risks are lowered, this has a positive impact on the growth of the technology frontier.[2]

The second group of risks, environmental risks, will enter the GREG model through the negative impact that environmental degradation has on the production of final goods. Climate change, pollution, the loss of biodiversity, and environmental disasters compromise the capacity of the economy to generate wealth, and, therefore, environmental risks are translated, in the model, in a change in the shape of the aggregate production function (as in Brock & Taylor, 2010; and Acemoglu et al., 2016). The new production function is expressed under the form,

$$y(t) = \left[\frac{z(t)}{\bar{z}}\right]^{-\xi} f[a(t)k(t), h(t)u(t)], \qquad \xi \geq 0 \tag{8}$$

In equation (8), $z(t)$ is a measure of environmental degradation (e.g., the concentration of carbon in the atmosphere); $\bar{z} \leq z(t)$ is a minimal level of pollution below which production is not compromised. Variable $z(t)$ is an exogenous variable in the model, under the interpretation that the environment is a global public good; the individual economy has no control over the value or the evolution of $z(t)$.

The third set of risks to consider are those under the geopolitical sphere. Geopolitical tensions are concretized, in the GREG model, in barriers to the adoption of global technologies (as in Stokey, 2015). This essentially expresses the retrenchment from globalization concern, i.e., the idea that international conflict makes countries close borders, reducing access to foreign knowledge. Let $b(t) \geq 0$ be the variable representing barriers to adoption; the higher the value of $b(t)$, the stronger are the barriers. This variable will enter the technology adoption equation of motion, modifying it to be:

$$\dot{a}(t) = \hat{a}\left[1 - \frac{a(t)}{A(t)} b(t)^{\beta}\right] a(t), \qquad \beta \geq 0 \tag{9}$$

[2] Notice that the interpretation adopted under the GREG model is that a risk does not need to materialize to have a factual nefarious impact on growth. The threat itself makes agents change behavior and adopt cautious actions that, in themselves, may slowdown growth. This logic is extensible to all other classes of risks beyond economic risks.

In equation (9), stronger barriers to adoption will make it harder for $a(t)$ to approach $A(t)$. Parameter β translates the elasticity of adoption to barriers. As in the case of previous risks, the assumed variable is exogenous to the economy: international tensions and conflict will determine the evolution over time of variable $b(t)$.

The fourth set of risks are those of a societal nature. Societal risks will, in general, lead to a loss of social interaction (as the result of public health issues or a breakdown of social cohesion). An increase in societal risks will translate, in the GREG model, into a faster obsolescence of human capital. Let $\omega(t) \geq 0$ is a measure of social interaction loss or societal risk, with higher values of the variable meaning lower levels of interaction. Relative to the SEG model, the new rate of obsolescence of human capital will be: $\delta_h + \dot{\omega}(t)/\omega(t)$. The human capital accumulation equation is changed to contemplate this new effect:

$$\dot{h}(t) = g[1 - u(t)]h(t) - \left[\delta_h + \frac{\dot{\omega}(t)}{\omega(t)}\right] h(t) \tag{10}$$

Finally, to represent technological risks, consider the use of digital data as an input in the production of ideas, and the associated risks to the security of data, i.e., cybersecurity risks. Represent digital data by variable $d(t)$; $d(t)$ in a non-rival global good that the national economy can access to generate new ideas and knowledge. Assuming this new variable, the technology adoption process is enhanced by the use of data, leading to the replacement of equation (5) by:

$$\dot{a}(t) = \hat{a}\left[1 - \frac{a(t)}{A(t)} d(t)^{-\eta}\right] a(t), \qquad \eta \in (0,1) \tag{11}$$

In equation (11), the use of data to improve the state of the economy's technology will allow a to grow at a faster rate than A in the BGP. In the specified circumstances,

$$\frac{\dot{a}}{a} = \gamma + \eta \frac{\dot{d}}{d} \tag{12}$$

The growth of the country's technological state will be faster than the growth of the world's technology frontier if the use of digital data as an input grows positively over time. However, data can have a disruptive effect in the presence of cybercrime, in the sense that cybercrime is likely to destroy data. Let $\delta_d(t) \geq 0$ be the variable representing cybercrime. If $\delta_d(t) = 0$, then data will have the positive effect of enhancing technology as described above. As $\delta_d(t)$ emerges and eventually becomes very large, the growth rate of technology approaches zero. This effect is modelled by replacing $d(t)$ in (11) by expression $d(t)\delta_d(t)^{-\varepsilon}$, $\varepsilon \in (0,1)$. In this case, the BGP growth rate of variable $a(t)$ becomes:

$$\frac{\dot{a}}{a} = \gamma + \eta\left(\frac{\dot{d}}{d} - \varepsilon \frac{\dot{\delta}_d}{\delta_d}\right) \tag{13}$$

While under (12), in the absence of cybercrime, the use of digital data to improve the state of technology would always increase the growth rate of a above the benchmark (no data) growth rate γ; with cybercrime this outcome is attenuated, and can even be reversed if the change in cybercrime is faster than the growth rate of the use of digital data.

In fact, if $\frac{\dot{d}}{d} < \varepsilon \frac{\dot{\delta}_d}{\delta_d}$ then $\frac{\dot{a}}{a} < \gamma$.

The important corollary is that the use of data may make the economy worse off if cybercrime increases at a faster rate than $d(t)$.

Taking together the set of systematized risks, one may, as in the SEG model, compute the growth rate of income in the BGP. The income growth rate of the GREG model is:

$$\frac{\dot{y}}{y} = \frac{1}{\theta}\left\{g - \left(\delta_h + \frac{\dot{\omega}}{\omega}\right) - (\rho - n) + \frac{\alpha}{1-\alpha}\left[\gamma - \frac{\dot{x}}{x} - \beta\frac{\dot{b}}{b} + \eta\left(\frac{\dot{d}}{d} - \varepsilon\frac{\dot{\delta}_d}{\delta_d}\right)\right]\right\} - \frac{\xi}{1-\alpha}\frac{\dot{z}}{z} \quad (14)$$

To maintain the integrity of the BGP, i.e., for the growth rate in equation (14) to be constant, all the risks must grow at constant rates. The higher the value of any of these rates, the lower will be the growth rate of the economy.

5. CONCLUSION

Economic growth theory has been designed to explain how the optimal behavior of agents and the efficient use of resources eventually conduct sustained growth over time. However, economic growth faces many obstacles, including a series of global risks that pervasively affect the economy and that are, to a large extent, exogenous to the economy's decision-makers. This essay has discussed how such global risks might affect income growth, by embedding them in a standard endogenous growth model and by analyzing the corresponding BGP, subject to risk perturbations.

The discussion relied upon the classification set forth by the World Economic Forum in its reports about global risks, which allocate such risks to five categories: economic, environmental, geopolitical, societal, and technological. The risks tend to stimulate one another and, therefore, the analysis of the impact of global risks over national growth should, first and foremost, explain how some initial shock (i.e., a rise in the probability of a risk to occur) may eventually spread to other risk areas, leading to a strong fall in the growth rates of technology adoption, human capital accumulation, consumption and income. This has been approached in the context of a standard growth model, which was reconfigured into a GREG model.

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Managing Circular Economy with a Strategic-Risk Approach

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Abstract: *The debate about the criticalities of the traditional linear economy-based business model is leading to a more sustainable way of production and consumption which is the circular economy (CE), defined as an economy capable of regenerating itself. However, there is an area of concern related to the risks arising from the changes that CE requires in processes, organization, governance, and relations within the supply chain and with stakeholders. This paper focuses on the main risk areas firms should manage for a successful strategic transition to CE, suggesting a conceptual framework for CE risk identification according to a strategic-based approach.*

1. INTRODUCTION

The current scarcity of raw materials, the high volatility of their prices, the environmental problems and related social consequences (such as the extension of desertified areas with increased poverty and migratory flows) highlight the need to quickly change the traditional model of economic development which is unsustainable in the long future. The solution invoked by international organizations and associations (as United Nations, World Business Council for Sustainable Development, European Community, Ellen MacArthur Foundation) is the transition from the linear economy – based on the 'take and discard' paradigm – to the circular economy (CE) – based on the ability to close the loop considering waste as a resource.

This transition will lead to great benefits for both society and businesses, but it requires to be approached with an awareness of its risks. The circular approach cannot be realized with a linear-based mindset, needing changes in technology, production and consumption processes, business models, organization and governance, and relations within the supply chain and with stakeholders. The inadequate consideration of these changes, and the underestimation of the risks they entail, can lead to the failure of circular projects.

To our knowledge, the existing literature about CE lacks a strategic vision, focusing on the different issues about CE and overlooking the emphasis on the strategic relevance of circular thinking which affects all the firm's decision-making processes and risks.

For this reason, the paper aims to answer the question about the *main risk areas to monitor for a strategic transition to CE within firms*. In particular, with this theoretical paper, we aim at stressing the need to consider the shift from the traditional linear business to the circular one

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according to a holistic and strategic point of view. Circularity should be embraced as a new vision of the future, and it cannot be isolated within certain firms' functions or projects. Without real conviction and strategic engagement by an entrepreneur, CE is likely to be a tool of marketing rather than a new way of doing business.

This research, despite its limitations, contributes to both filling an existing gap in the literature and suggesting practitioners approach CE with a strategic and risk-based approach.

2. LITERATURE REVIEW

The concept and definition of CE are still debating (Kirchherr et al., 2017), even if there is consensus on some basic principles attributable to the so-called "R strategies" (Morseletto, 2020) oriented to stress the useful application of materials, the extended lifespan of products and their parts, and the focus on smarter product manufacturing and use.

The first publication talking about an economy based on circular thinking is the article by Boulding (1966) who distinguished the "cowboy" economies characterized by reckless and exploitative behaviors and the "spaceship" economies characterized by finite and limited resources. The term CE in the economy is used for the first time by Pearce and Turner (1990) who criticized the linear economy in contrast with the circular natural system.

In 2010, Ellen MacArthur founded the Ellen MacArthur Foundation (EMF) which officially carried the circular economy concept to be known internationally. Since then, abundant literature on CE has grown, studying the different nuances of the concept: defining aspects (Kirchherr et al., 2017; Rizos et al., 2017); metrics and indicators (Moraga et al., 2019; Pauliuk, 2018); new business model's conceptualization (Bressanelli et al., 2018; Gennari, 2022a; Mendoza et al., 2017; Pieroni et al., 2019); enablers or barriers (Scipioni et al., 2021; Tura et al., 2019); risks within the supply chain (Dulia et al., 2021; Ethirajan et al., 2021) or in special industries (Agyemang et al., 2019; Moktadir et al., 2018).

The literature on the theme appears to be still fragmented without a comprehensive point of view about the main factors, and related risks, to manage a successful transition from the linear to the circular business.

In this paper, we refer to the transition management theory (Jackson et al., 2014). It recognizes that transitions are complex phenomena, suggesting to catalyze the attention to some key factors able to influence the change towards the desired direction. For this reason, we aim at considering together these key factors and the related risks to design a conceptual framework able to give a holistic and strategic approach to circular businesses.

Researchers attempted to identify the key factors of the circular transition in the main drivers of the CE (Gennari, 2022b; Kirchherr et al., 2018): culture and governance; relations with stakeholders, and innovation.

The orientation of an organization towards sustainability and CE depends on the vision and the culture of its leaders (Gennari & Salvioni, 2019; Lahti et al., 2018; Rao & Tilt, 2016). According to several authors, (Eccles et al., 2011; Miller & Serafeim, 2014) the engagement of the entrepreneur and leaders for these issues goes through different and progressive steps: the first, the

focus is on compliance with regulations (in this case CE is not approached with a strategic attitude); in the second stage sustainability, and hence CE, are seen as tools to improve the organizational efficiency thanks to the engagement of the internal stakeholders; finally, when strategies are sustainability-driven, CE impacts on the organization, business model and relations with the other stakeholders.

The management of relations with stakeholders can be a source of competitive advantage in globalized and dynamic markets because the creation of sustainable value, in the interest of both company and society, increases stakeholders' consensus and related attraction of resources (Salvioni & Gennari, 2017). In the CE, the importance of the network value emerges and drives the company's attitude towards stakeholders, promoting the maximization of economic and socio-environmental performance in the long rather than the short term.

Finally, innovation, when it is managed by a value chain network, is a focal key driver for CE. Radical innovations in products and processes are necessary for achieving circularity because of the re-signification of waste within the value chain. This fact requires changes in the business model to guarantee the organization's support, measure the sustainability performance, understand clients' and consumers' needs, and collaborate with the other interested parties.

3. CONCEPTUAL FRAMEWORK AND THEORETICAL BACKGROUND

The main drivers of CE find their validity in widely recognized theories.

Circular business, benefiting both organizations and society, represents the practical aspect of the *shared-value theory* (Porter & Kramer, 2011), which is based on the assumption that the integration of social and environmental issues within the core strategy of a company creates social value and competitive advantage. Shared value embeds a social purpose in the culture of the company which leaders have to be inspired by in their strategic choices. Hence, CE requires a shared value-oriented entrepreneurial vision, based on a shared agenda, strategic alignment, and network capabilities with the relevant stakeholders.

Value creation according to the sustainability principle is based on the ability to relate with different categories of stakeholders with a logic that values everyone's contribution as *stakeholder theory* states (Freeman, 1984). In this way, all the actors within the value chain are an essential part of the success of the firm's circular strategy (Salvioni & Almici, 2020). The mutual support of all stakeholders is needed to effectively implement the idea of the CE; hence, the company must be able to intercept stakeholders' interests and perspectives.

Finally, CE is based on innovation both in the production/consumption processes and in the governance organization, being characterized by different design techniques, materials to be used, methods of disposal, and different work organizations. The *innovation evolutionary theory* (Nelson & Winter, 1982) states that organizations can change the economic system thanks to experimentation. The CE might also be viewed as a transitional evolutionary approach that involves techniques and organizations; in fact, it requires fundamental changes in the whole industrial structure encouraging different businesses to work together to close the loop.

In this paper, we aim at matching the key issues of CE with the main causes of strategic risk. Strategic risk can be defined as the risk affecting the ability to achieve the desired goals of the

business (COSO, 2017; Veleva & Bodkin, 2018; Brillinger et al., 2020). In particular, the most acknowledged risk management framework (COSO, 2017) emphasizes the importance to be aware of the risks which can affect the desired firm's performance.

The first strategic risk is about the misalignment between strategy and mission, vision, and core value; the second strategic risk derives from the strategy's risk assessment; the third one is the risk affecting the practical execution of the chosen strategy.

Conceptual framework crosses (Table 1):
- the key factors to strategically manage for a successful transition of the business towards the CE (culture and governance, relations with stakeholders, and innovation)
- the key strategic risks, that is the risks affecting the success of circular strategies (misalignment with corporate mission and vision, incorrect strategy evaluation, and failures in the strategy execution).

Table 1. Conceptual framework for a strategic risk-based approach to the CE

	Strategy misalignment with mission, vision and core values	**Incorrect strategy evaluation**	**Failures in strategy execution**
Culture and governance	Risk related to corporate culture and leadership still rooted in the linear approach	Risk related to contradiction between circular strategy and external/internal context	Risk related to linear-focused organization and management control
Relations with stakeholders	Risk related to the inability to engage stakeholders in the circular strategy	Risk related to mistakes in the materiality (relevance) analysis and inability to create a network-based business model	Risk related to the lack of accountability to stakeholders and collaboration with them
Innovation	Risk related to the low propensity for innovation	Risk related to the use of traditional evaluation criteria too focused on short-term and economic performance	Risk related to problems in the management of innovative products/ processes

Source: Own research

As we can see in Table 1 the main risks affecting the CE transition can be placed in nine areas to be monitored. This framework encourages first critical analysis of the potential causes of failure of circular businesses.

When circular strategies are not aligned with the mission and vision they appear as something extraneous: circularity is declared but it is not understood and shared with stakeholders or it is deliberately used as a greenwashing tool, without a real will to move towards CE. Also, the assessment of CE strategies can be affected by the risks related to contradiction with the external or internal context (e.g. an organization unable to support the circular business) and with the traditional assessment tools that are not ready to catch the opportunities (not always directly measurable) rising in the long-term. A good materiality analysis aimed at giving relevance to a few important issues for the firm and its stakeholders can reduce the risk related to taking conflicting or unshared actions. Finally, even a well-designed strategy can fail in the concrete implementation phase because of the attempt to manage a circular business with a linear organization, the inability to communicate with the stakeholders engaged in the CE strategy, or the inability to govern radical innovations.

4. CONCLUSION

The CE will be the future model of production and consumption able to solve the problems related to the scarcity of raw materials and climate change. Nevertheless, the shift to CE by firms can be difficult because of the need to re-design processes, business models, tools and relations according to the circular approach. Currently, the financial sector considers circular projects characterized by a high-risk level because of the uncertainty of this transition (EC, 2020). Thus, CE strategies must be managed with a risk-based approach to minimize the chance of their failure. In this paper, we suggest overcoming a fragmented approach to CE considering both the main factors (culture and governance, relations, innovation) on which the success of circular strategies depends, and the main risks affecting these factors in the development of the strategic path (strategy definition, assessment, and execution).

The conceptual framework we propose wants to be a basis for thinking about the importance of a holistic risk-based approach to CE by firms.

The research, despite its limits (mainly attributable to the theoretical perspective), can contribute to the CE literature, which appears to be still fragmented and can be an easy-to-use tool for firms that aim at becoming aware of their attitude towards circularity. We suggest future research to test the conceptual framework within organizations.

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A Survey on Efficiency and Profitable Trading Opportunities in the Cryptocurrency Markets: An Approach in the Context of the War of 2022

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Abstract: *In this paper, we analyse the long memory process in the cryptocurrencies Bitcoin (BTC), Cardano (ADA), Binance Coin (BNB), Dogecoin (DOGE), Ethereum (ETH) and Ripple (XRP) from January 1st, 2018, to November 10th, 2022, which includes the 2020 and 2022 events. The results demonstrate that the daily returns are leptokurtic, and the distributions are non-Gaussian. We also observe non-linearity, implying autocorrelation or conditional heteroscedasticity in digital currencies. The DFA exponents reveal that throughout the Tranquil period, digital currencies with current values higher than 0.5 exhibited long memory in their returns. The BNB digital currency has an exponent of 0.5, indicating that the series were unpredictable throughout this period. As can be shown, all cryptocurrencies offer values of the DFA exponent greater than 0.5 in the Stress subperiod, implying that the higher the DFA exponent and closer to 1, the higher the persistence, as well as the autocorrelation between observations and stronger predictive ability. The findings support the evidence examined by the BDS test, namely that price movements are not i.i.d. (independent and identically distributed) and that investors have a high possibility of achieving above-average returns through arbitrage.*

1. INTRODUCTION

The Efficient Market Theory is founded on the contributions of Mandelbrot (1963), Samuelson (1965), and Fama (1965a, 1965b, 1970, 1991). According to these authors, a market is efficient if agents are rational and there is enough liquidity for any sort of relevant information to be integrated into pricing instantly, preventing systematic forecasting. More specifically, Fama (1970) defines an efficient market as one in which the present price of an asset completely reflects all available information. In an effective market, price formation should be unpredictable and reflect the information and expectations of all market players. Three forms of efficiency may be distinguished based on the available information provided in prices: (i) weak efficiency: asset prices reflect all historical information; (ii) semi-strong efficiency: in this case, prices reflect both historical and public information available on assets and (iii) strong efficiency: asset prices reflect all existing information (historical, public, and private).

Currently, cryptocurrencies are well-established and widely accepted as an alternative method of currency exchange, appearing in the majority of financial transactions; as a result,

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cryptocurrency trading is widely regarded as one of the most popular and promising types of investments, with above-average returns in certain markets. However, because this rapidly expanding financial market is characterized by considerable volatility and significant price fluctuations in a short period, the development of an accurate and trustworthy forecasting model is seen as critical for portfolio management and optimization. The cryptocurrency market has recently been extremely turbulent, and we can identify strong bullish and bearish market occurrences in the years 2021-2022 (Horta, Dias, Revez, Alexandre & Heliodoro, 2022; Horta, Dias, Revez, Heliodoro & Alexandre, 2022).

This research will provide insight into the presence of long memories in the digital currency markets of Bitcoin (BTC), Cardano (ADA), Binance Coin (BNB), Dogecoin (DOGE), Ethereum (ETH), and Ripple (XRP) from January 1st, 2018, to November 10th, 2022, which includes the 2020 and 2022 events. The results show that the returns are non-linear and exhibit conditional heteroscedasticity. In response to the research question, the DFA exponents show a strong long-memory trend, as evidenced by the fact that all cryptocurrencies have values greater than 0.5, meaning that the higher the DFA exponent and the closer it is to one, the stronger the persistence, as well as the autocorrelation between the data and the greater the predictive capacity. In conclusion, investors that use robust trading techniques have a better probability of outperforming the market average.

The study improves and complements the previous literature in several aspects: first, it is a new contribution to the incipient study of cryptocurrency analysis; second, unlike most papers focused on the study of Bitcoin, this study covers six of the most relevant cryptocurrencies by capitalisation; and third, unlike most existing literature, we jointly analyse the events of the 2020 global pandemic and the Russian invasion of Ukraine, which, as far as we are aware, no other paper has included.

The article is divided into five sections. Therefore, section 1 is an introduction, and section 2 is a review of the literature on articles that investigated the presence of long-term memories in digital currency returns. The data, as well as the methodology to be developed to reply to the research question, are presented in Section 3. The findings of the investigation are described in Chapter 4, while the main conclusions are presented in Section 5.

2. LITERATURE REVIEW

In recent years, institutional and individual investors have shown a significant interest in the development of digital currencies, with a particular emphasis on Bitcoin and Ripple. The trading of these cryptocurrencies has resulted in speculative price formation fluctuations; research has demonstrated that this trading approach has resulted in "bubbles" in international financial markets, leading to significant structural breaks (see the Dot.com crisis, the 2007-2008 crisis, the 2015-2016 stock market crash in China, among others). Considering cryptocurrencies have the same trading characteristics as stocks, the base metals markets, such as gold, may serve as a safe haven for digital currencies due to their lower correlation to global equity indexes (Kakinaka & Umeno, 2021).

Derbentsev et al. (2019) investigated the impact of long memory and multifractal properties on time series of the most capitalized cryptocurrencies from 2010 to 2018. The Hurst exponent and DFA were chosen for this purpose because they are more stable in the scenario of non-stationary

time series. The authors emphasize that the cryptocurrency time series are persistent throughout virtually the whole research period, which makes accepting the market efficiency hypothesis in its weak form unfeasible. They also reveal that during times of crisis and market instability, time series have become anti-persistent. Authors Tran and Leirvik (2020) show that the level of market efficiency in the five main cryptocurrencies varies greatly over time. Before 2017, cryptocurrency markets were particularly inefficient. This endorses recent studies on the subject. However, cryptocurrency markets become more efficient over time in the 2017-2019 period, with Litecoin being the most efficient cryptocurrency on average and Ripple being the least efficient.

López-Martín et al. (2021) investigated the presence of long memory in cryptocurrency markets, namely Bitcoin, Litecoin, Ethereum, Ripple, Stellar, and Monero, 2021. The authors employed a set of five tests that are applicable in both static and dynamic contexts to analyse the efficiency of these markets. The findings produced are impacted by both the period under consideration and the approach employed to measure the predictability of the return. However, certain conclusions may be drawn: first, they discovered that, in general, efficiency increases over time. Second, while market efficiency appears to change over time, developments in the Bitcoin, Litecoin, and Ethereum markets demonstrate a clear trend shifting from less to higher efficiency. There is a tendency toward predictability in the digital currencies Ripple, Stellar, and Monero. In addition, author Kang (2021) used Hurst's R/S analysis to explore the long memory properties of four cryptocurrencies (Bitcoin, Dash, Ethereum, and Litecoin), demonstrating that volatility increases the existence of persistence. The empirical findings suggest that volatility and returns in cryptocurrency markets have a long memory over time. The average Hurst exponents are significantly higher than 0.5, demonstrating the presence of long memory. Volatility's long memory is stronger than that of returns. The Hurst exponent values for the digital currency BTC change over time and are significantly higher than those for other cryptocurrencies (DASH, ETH and LTC). This research suggests that the BTC is less efficient than other cryptocurrency markets. As a result, the presence of long memory is essential for predicting the future cryptocurrency prices, asset allocation, and portfolio valuation.

In more recent studies, Fang et al. (2022) used the generalized Hurst exponent to analyse long memory properties at various time scales: intraday (1 minute), daily, and weekly data. The authors demonstrate that efficiency is related to time scales, i.e., in the long term, Bitcoin is not predictable regardless of frequency, however when analysing 1 - minute and weekly data, BTC exhibits long memory in its returns. The authors' Wu et al. (2022), on the other hand, investigated the predictability of digital currencies BTC, Ethereum, Binance Coin, the S&P 500 stock index, and the Gold market during the 2020 pandemic. The authors demonstrate that Bitcoin remains efficient after the onset of the pandemic and that Bitcoin is more efficient than digital currencies such as Ethereum, Binance Coin, and the S&P 500 during the Covid-19 outbreak.

In essence, the purpose of this study is to add to the current literature by demonstrating whether digital currencies are predictable during times of uncertainty in the global economy, namely during the events of 2020 and 2022.

3. DATA

The relative data are the cryptocurrency market closing prices for Bitcoin (BTC), Cardano (ADA), Binance Coin (BNB), Dogecoin (DOGE), Ethereum (ETH), and Ripple (XRP) from January 1st, 2018, to November 10th, 2022, (1775 data points). To increase the research's robustness,

we divided the sample into two sub-periods: Tranquil, which lasted from January 2018 to December 2019 (730 observations), and Stress, which went from January 2020 to November 2022 (1045 observations). The data is in US dollars and was acquired from the Thomson Reuters Eikon platform.

Table 1. The name of countries and their indexes used in this paper

Country	Index	Acronym
Global	Bitcoin	BTC
Global	Cardano	ADA
Global	Binance Coin	BNB
Global	Dogecoin	DOGE
Global	Ethereum	ETH
Global	Ripple	XRP

Source: Own elaboration

4. METHODOLOGY

To answer the research question, we shall deal with the time data in steps. We will first make graphs in levels to understand the fluctuation of the digital currency markets, and then graphs in returns to understand the dispersion concerning the market average and current volatility. To assess if the time series are skewed and have Gaussian distributions, we will use descriptive statistics such as mean, standard deviation and skewness. We will also analyse the fat tails in the data distribution using kurtosis and confirm it using the Jarque and Bera (1980) model.

To validate the fundamental assumption in statistical inference and determine whether the time series follows a white noise, we will use Hadri's (2000) and Im´s et al. (2003) panel stationarity tests. We will filter the residuals and use the Brock and de Lima (1996) test to determine if the time data are linear or have non-linear components. The Econophysical Detrended Fluctuation Analysis (DFA) model will also be applied to answer the research question. DFA is an analysis method that investigates time dependency on several time scales, avoiding spurious results. See the articles by Guedes et al. (2022), Dias, Pereira, et al. (2022), Dias, Pardal, et al. (2022), and Zebende et al. (2022) for a deeper understanding of the econophysics model (2022).

Table 2. Detrended Fluctuation Analysis (DFA)

Exponent	Type of signal
$\alpha_{DFA} < 0.5$	long-range anti-persistent
$\alpha_{DFA} \simeq 0.5$	uncorrelated, white noise
$\alpha_{DFA} > 0.5$	long-range persistent

Source: Own elaboration

5. RESULTS

The international financial markets reacted strongly to the initial reports of a new disease, Covid-19, that appeared in the Chinese city of Wuhan, because of the uncertainty it caused and the significant impact it had on the global economy, namely the paralysis of economic activity. Later, in February 2022, a militarized Russian operation on Ukrainian territory triggered a landscape of extreme complexity, with several economies intervening to prevent the conflict from escalating.

In times scenarios of increased geopolitical tensions, investors tend to take a risk-averse approach, shifting their investments from riskier to safer alternatives. Figure 1 depicts the evolution, in levels, of the cryptocurrencies Bitcoin (BTC), Cardano (ADA), Binance Coin (BNB), Dogecoin (DOGE), Ethereum (ETH), and Ripple (XRP), indicating that the pandemic had only a slight impact on the behaviour of digital currencies, with increased volatility in 2021 and 2022. The general collapse in 2022 might indicate that Russia-Ukraine conflicts influenced cryptocurrency movements. These conclusions are supported by the authors Pardal, Dias, Teixeira, and Horta (2022), Dias, Pardal, et al. (2022), Teixeira, Dias, Pardal & Horta (2022), who demonstrate structural breaks in international financial markets as a result of the 2020 and 2022 events.

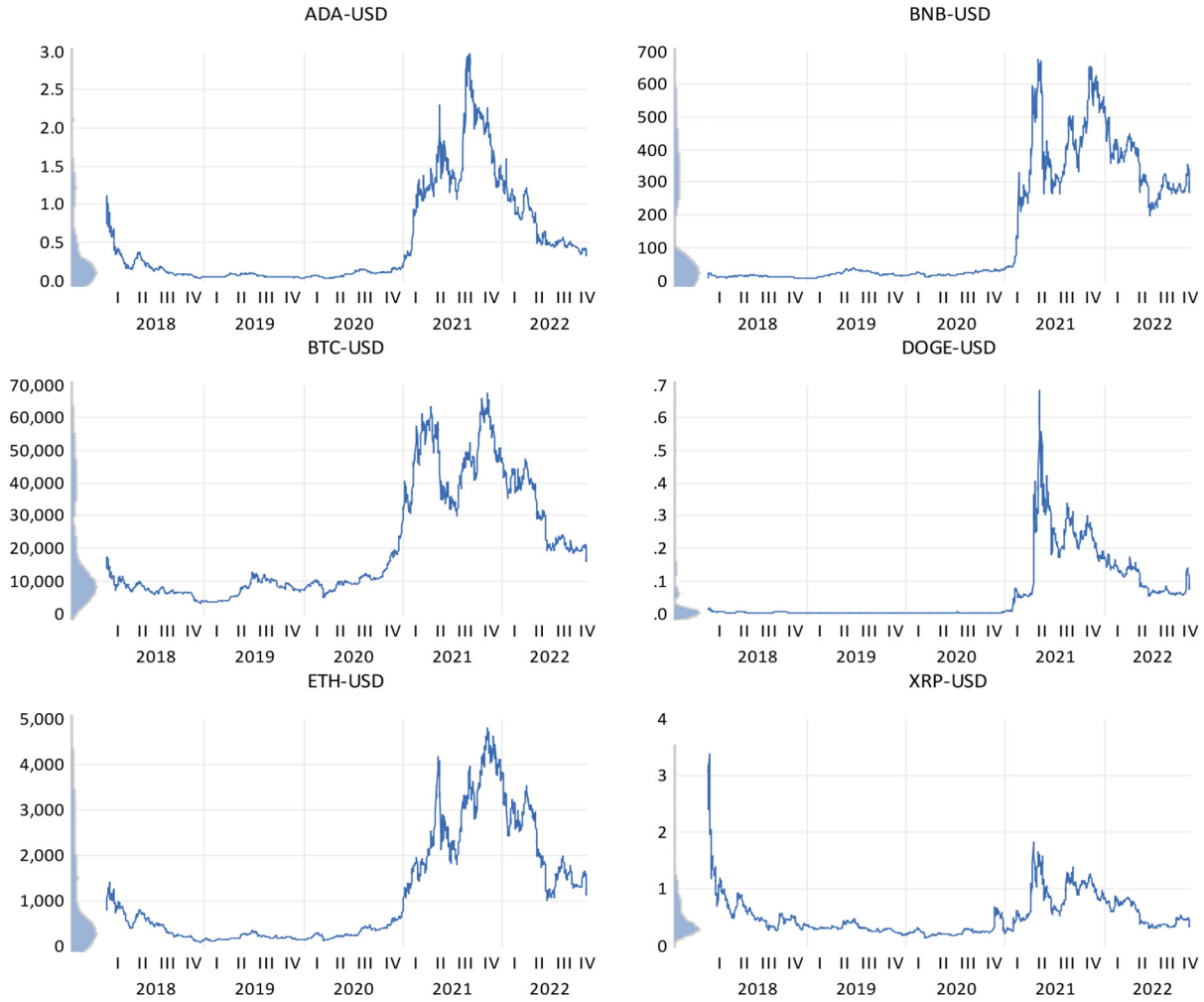

Figure 1. Evolution, in levels, of the 6 cryptocurrencies, during the period from January 1st, 2018, to November 10th, 2022

Source: Own elaboration

Figure 2 shows the evolution of digital currencies, particularly Bitcoin (BTC), Cardano (ADA), Binance Coin (BNB), Dogecoin (DOGE), Ethereum (ETH), and Ripple (XRP), in terms of their return, is distinguished by a relative dispersion from the average from January 1st, 2018, to November 10th, 2022. It is also conceivable to see rather volatile behaviour throughout the first and third quarters of 2021, which will be particularly noticeable in the DOGE cryptocurrency. The authors Dias and Santos (2020a, 2020b), Vasco et al. (2021), and Dias and Carvalho (2021) also demonstrate a significant dispersion in international financial markets compared to the average induced by the 2020 global pandemic.

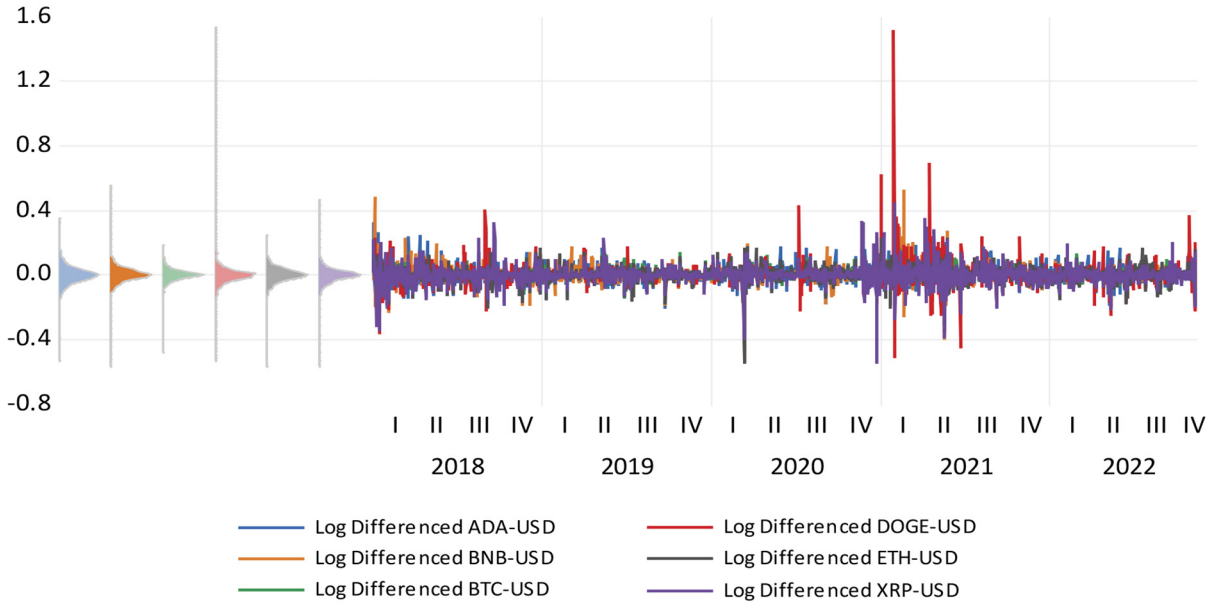

Figure 2. Evolution, in returns, of the 6 cryptocurrencies under analysis, during the period from January 1st, 2018, to November 10th, 2022

Source: Own elaboration

Table 3 shows the results of statistical measures such as the mean, standard deviation, asymmetry, and kurtosis applied to the 6 cryptocurrencies under consideration, namely Bitcoin (BTC), Cardano (ADA), Binance Coin (BNB), Dogecoin (DOGE), Ethereum (ETH), and Ripple (XRP), from January 1st, 2018, to November 10th, 2022. The BNB cryptocurrency is the most profitable (0.002018), while the ADA and XRP coins both exhibited negative returns (-0.000378 and -0.001030, respectively). Concerning risk, the digital currency DOGE is the most volatile (0.077675), while BTC is the least volatile (0.039461). Analysing the asymmetry coefficients, it is concluded that the distribution of the data of the cryptocurrencies ADA, BTC, ETH and XRP, for the period under study, is said to be asymmetric to the left, whereas for the coefficient of the cryptocurrency XRP the asymmetry is said to be weak (-0.093527), for the coefficients of ADA and ETH the asymmetry is said to be moderate (-0.052336 and -0.994230, respectively) and for BTC it is said to be strong (-1.068236). In contrast to the direct distribution, the BNB and DOGE have asymmetric distributions, with the BNB having a moderate skewness (0.254623) and the DOGE having a strong skewness (5.031409).

Table 3 also displays kurtosis values (the degree of flattening of a distribution), which are positive and significantly higher than those predicted for a normal distribution (3), showing that the empirical distribution of daily returns under consideration is leptokurtic. It is important to note that the DOGE cryptocurrency has the highest kurtosis value (94.50102) and ADA the lowest kurtosis value (8.223712). In corroboration, Jarque and Bera (1980) test validates the analysis done to asymmetry and kurtosis, that is, H_0 is rejected at the significance level of 1%, indicating that it is not possible to validate the exact normality of data.

Aside from the premise of data normality, it is crucial to assess the stationarity of time series. Prior testing of each sample series is essential in this context to prevent producing spurious regressions (Tahai et al., 2004). Panel unit root tests proposed by Im et al. (2003) and Hadri (2000) were used to test the stationarity of the time series of the 6 cryptocurrencies, namely Bitcoin (BTC), Cardano (ADA), Binance Coin (BNB), Dogecoin (DOGE), Ethereum (ETH), and Ripple (XRP). The first test postulates the existence of unit roots in the observable components of the time series as the

null hypothesis, and the results obtained are shown in Table 4, leading to the rejection of the null hypothesis at a significance level of 1%. Table 5 displays the results of the second test, whose null hypothesis assumes the time series stationarity (mean = 0; constant variance). The findings support the evidence of time series stationarity in first differences, as the p-value is higher than any significance level that could be assumed, leading to the rejection of H_0.

Table 3. Descriptive statistics, in returns, of the 6 cryptocurrencies, during the period from January 1st, 2018, to November 10th, 2022

	ADA-USD	BNB-USD	BTC-USD	DOGE-USD	ETH-USD	XRP-USD
Mean	-0.000378	0.002018	0.000138	0.001311	0.000288	-0.001030
Std. Dev.	0.059561	0.057551	0.039461	0.077675	0.051380	0.060003
Skewness	-0.052336	0.254623	-1.068236	5.031409	-0.994230	-0.093527
Kurtosis	8.223712	19.32062	15.93790	94.50102	12.75395	15.60377
Jarque-Bera	2018.924	19718.91	12717.42	626700.5	7328.787	11751.24
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	1775	1775	1775	1775	1775	1775

Source: Own elaboration

Table 4. Im, Pesaran and Shin test (2003) applied to the 6 cryptocurrencies under analysis, during the period from January 1st, 2018, to November 10th, 2022

Null Hypothesis: Unit root (individual unit root process)							
Method					**Statistic**		**Prob.****
Im, Pesaran and Shin W-stat					-89.4530		0.0000
** Probabilities are computed assuming asymptotic normality							
Intermediate ADF test results							
						Max	
Series	**t-Stat**	**Prob.**	**E(t)**	**E(Var)**	**Lag**	**Lag**	**Obs**
D(ADA-USD)	-45.659	0.0001	-1.532	0.735	0	24	1773
D(BNB-USD)	-16.833	0.0000	-1.494	0.781	5	24	1768
D(BTC-USD)	-43.358	0.0001	-1.532	0.735	0	24	1773
D(DOGE-USD)	-8.1150	0.0000	-1.456	0.818	18	24	1755
D(ETH-USD)	-44.841	0.0001	-1.532	0.735	0	24	1773
D(XRP-USD)	-40.851	0.0000	-1.532	0.735	0	24	1773
Average	-33.276		-1.513	0.757			

Source: Own elaboration

Table 5. Hadri stationarity test (2000), applied to the 6 cryptocurrencies under analysis, during the period from January 1st, 2018 to November 10th, 2022

Null Hypothesis: Stationarity				
Method			**Statistic**	**Prob.****
Hadri Z-stat			-0.02300	0.5092
Heteroscedastic Consistent Z-stat			-0.64399	0.7402
Intermediate results on D(UNTITLED)				
		Variance		
Series	**LM**	**HAC**	**Bandwidth**	**Obs**
D(ADA-USD)	0.1366	0.002032	10.0	1774
D(BNB-USD)	0.0658	150.5167	4.0	1774
D(BTC-USD)	0.1656	1005741.	2.0	1774
D(DOGE-USD)	0.0381	0.000120	23.0	1774
D(ETH-USD)	0.1128	6354.909	9.0	1774
D(XRP-USD)	0.2459	0.002859	1.0	1774

* Note: High autocorrelation leads to severe size distortion in Hadri test, leading to over-rejection of the null.
** Probabilities are computed assuming asymptotic normality.

Source: Own elaboration

Table 6. BDS test applied to time series residuals, concerning the 6 cryptocurrencies under analysis, during the period from January 1st, 201,8 to November 10th, 2022

BDS Test for ADA-USD					
Dimension	**BDS Statistic**	**Std. Error**	**z-Statistic**	**Prob.**	
2	0.015796	0.002204	7.167222	0.0000	
3	0.030530	0.003496	8.732305	0.0000	
4	0.041439	0.004156	9.969798	0.0000	
5	0.050152	0.004325	11.59531	0.0000	
6	0.052750	0.004165	12.66636	0.0000	
Raw epsilon		0.077646			
Pairs within epsilon		2213847.	V-Statistic	0.702669	
Triples within epsilon		3.02E+09	V-Statistic	0.540158	
Dimension	C(m,n)	c(m,n)	C(1,n-(m-1))	c(1,n-(m-1))	c(1,n-(m-1))^k
2	802533.0	0.510306	1105910.	0.703214	0.494510
3	595889.0	0.379335	1105783.	0.703927	0.348805
4	450930.0	0.287380	1104995.	0.704219	0.245942
5	349764.0	0.223158	1103505.	0.704065	0.173006
6	273317.0	0.174580	1102293.	0.704086	0.121830
BDS Test for BNB-USD					
Dimension	**BDS Statistic**	**Std. Error**	**z-Statistic**	**Prob.**	
2	0.019757	0.002315	8.534003	0.0000	
3	0.040890	0.003681	11.10729	0.0000	
4	0.055740	0.004387	12.70479	0.0000	
5	0.064393	0.004577	14.06928	0.0000	
6	0.067297	0.004418	15.23259	0.0000	
Raw epsilon		0.065894			
Pairs within epsilon		2218189.	V-Statistic	0.704047	
Triples within epsilon		3.04E+09	V-Statistic	0.544438	
Dimension	C(m,n)	c(m,n)	C(1,n-(m-1))	c(1,n-(m-1))	c(1,n-(m-1))^k
2	811778.0	0.516184	1108052.	0.704576	0.496427
3	615515.0	0.391829	1108033.	0.705359	0.350938
4	475652.0	0.303136	1106625.	0.705258	0.247396
5	374084.0	0.238675	1105128.	0.705100	0.174282
6	297586.0	0.190082	1103728.	0.705003	0.122785
BDS Test for BTC-USD					
Dimension	**BDS Statistic**	**Std. Error**	**z-Statistic**	**Prob.**	
2	0.010382	0.002433	4.267649	0.0000	
3	0.020586	0.003864	5.328079	0.0000	
4	0.027321	0.004600	5.940023	0.0000	
5	0.034598	0.004793	7.218347	0.0000	
6	0.037876	0.004622	8.194940	0.0000	
Raw epsilon		0.049099			
Pairs within epsilon		2214373.	V-Statistic	0.702836	
Triples within epsilon		3.05E+09	V-Statistic	0.545210	
Dimension	C(m,n)	c(m,n)	C(1,n-(m-1))	c(1,n-(m-1))	c(1,n-(m-1))^k
2	794349.0	0.505102	1106145.	0.703363	0.494720
3	580774.0	0.369713	1106123.	0.704143	0.349127
4	430201.0	0.274169	1106012.	0.704868	0.246848
5	326681.0	0.208431	1104557.	0.704736	0.173833
6	250883.0	0.160251	1103112.	0.704610	0.122375

Notes: The method considered in the BDS test was the pair fraction, for a value of 0.7. The first column refers to the embedding dimension.

Source: Own elaboration

Table 6 shows the results of the BDS test, which was applied to the cryptocurrencies Bitcoin (BTC), Cardano (ADA), Binance Coin (BNB), Dogecoin (DOGE), Ethereum (ETH), and Ripple (XRP) from January 1st, 2018, to November 10th, 2022, and it is confirmed that the null

hypothesis that the data are i.i.d. is rejected, leading us to believe that the returns of the cryptocurrencies under study are nonlinear. These findings might point to the existence of autocorrelation or heteroscedasticity in the digital currencies under consideration, resulting in some predictability and the prospect of above-average market profits. These findings are supported by the authors Dias, Heliodoro, et al. (2019), Dias, da Silva, et al. (2019), Dias, Heliodoro, Teixeira, et al. (2020), Silva et al. (2020), Dias and Santos (2020a), Dias, Pardal, Teixeira, et al. (2020), who highlight the existence of strong probabilities of above-average gains by investors when using adjusted trading strategies.

DFA is a scaling analysis approach that is used to estimate exponents that characterize long-term correlations. The time series of the cryptocurrencies Bitcoin (BTC), Cardano (ADA), Binance Coin (BNB), Dogecoin (DOGE), Ethereum (ETH), and Ripple (XRP) from January 1st, 2018, to November 10th, 2022, were examined. The DFA exponents calculated for the Tranquil and Stress subperiods are shown in Table 7, with the latter highlighted by events in 2020 (Covid-19 pandemic) and 2022 (military conflict between Russia and Ukraine). During the period of financial market tranquillity, the DFA exponents for all cryptocurrencies, except BNB, indicated values greater than 0.5 and less than 1, leading us to believe that these digital currencies presented a non-random price fluctuation process with a persistent trend, whereas the BNB digital currency presented an exponent equal to 0.5, indicating the existence of randomness of the series in this period.

During the Stress period, there is once again a tendency for persistent long memory, because, as can be observed, all cryptocurrencies have DFA exponent values higher than 0.5. The higher the DFA exponent and the closer it is to one, the greater the persistence and the correlation between observations and higher prediction ability (i.e., higher probability of predicting short-term changes). The results corroborate the evidence considered by the BDS test, namely that price fluctuations are not i.i.d. and that investors have a high possibility of achieving above-average returns; this evidence does not support the hypothesis of efficiency and transparency of the available information.

These findings are validated by the authors Manuel et al. (2020), Dias et al. (2020, 2021), Dias, Alexandre, et al. (2021), Dias, Santos, et al. (2021), Santos et al. (2021), Dias, Pardal, et al. (2022), Teixeira, Dias, and Pardal (2022), who evidence the existence of long memories in periods of stress in international financial markets.

Table 7. DFA exponent for index and return*

Cryptocurrency	DFA exponent (Tranquil)	DFA exponent (Stress)
BTC-USD	0.54 ≅ 0.0046***	0.54 ≅ 0.0017***
ADA-USD	0.57 ≅ 0.0076***	0.57 ≅ 0.0018***
BNB-USD	**0.50 ≅ 0.0136**	0.58 ≅ 0.0024***
DOGE-USD	0.59 ≅ 0.0040***	0.52 ≅ 0.0024***
ETH-USD	0.58 ≅ 0.0065***	0.54 ≅ 0.0014***
XRP-USD	0.56 ≅ 0.0037***	0.56 ≅ 0.0082***

* The values of the linear adjustments for α DFA always had R2 > 0.99.

Note: The hypotheses are H_0: $\alpha = 0.5$ and H_1: $\alpha \neq 0.5$. ***, **, *, represent significance at 1%. 5% and 10%. respectively.

Source: Own elaboration

6. CONCLUSION

The overall conclusion to be drawn from the results obtained employing econometric and econophysics models is that the events of 2020 and 2022 caused long memories in the cryptocurrency markets, with no significant differences in the predictability of these markets in both the Tranquil and Stress periods. These findings do not confirm some of the research that was reviewed, which demonstrates that digital currency markets are generally efficient over time; we do not validate this evidence. This has significance for investors because certain returns may be expected, which opens up the potential for arbitrage and abnormal returns. These findings also provide an opportunity for market regulators to adopt measures to improve informational information in these regional markets.

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Time-Varying Co-movements between Wti and European Capital Markets: Implications for Portfolio Diversification and Hedging Strategies

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Abstract: *This paper aims to analyse whether the events of 2020 and 2022 (Covid-19 pandemic crisis, the oil price war between Russia and Saudi Arabia, and the Russian invasion of Ukraine in 2022) affected efficiency, and accentuated shocks across markets in the Netherlands (AEX), Belgium (BEL 20), France (CAC 40), Portugal (PSI 20), Norway (OBX), and in the West Texas Intermediate (WTI) oil index, during the period from September 18th, 2017, to 15th, September 2022. The findings reveal that markets exhibit more substantial signals of (in)efficiency throughout the global economy's uncertainty sub-period; nonetheless, we find that the shocks across markets did not increase from the Tranquil sub-period to the Stress sub-period. Furthermore, we also find that WTI lacks the hedging and haven features exhibited by the European capital markets studied. These findings have significant consequences, especially for overseas investors and oil corporations, which try to spread risk, particularly during uncertain times. Finally, we demonstrate that there is no evidence that market (in)efficiency increases the co-movements.*

1. INTRODUCTION

Just when the Covid-19 pandemic appeared to be calling a truce and restoring some normalcy to our lives, Europe has been shaken once more by a crisis triggered by the situation in Ukraine. Russia's invasion of Ukraine has caused financial market volatility, with European markets dropping and the impacts reflected in the oil and food prices. A war scenario carries with it a humanitarian disaster, with the most vulnerable bearing the effects (Bloomberg, 2022).

Economic and management researchers are interested in time series dependence. To evaluate if price formation processes follow a random walk, it is important, for example, to investigate the presence of temporal dependency or sectional dependence. The efficient market hypothesis is critical in this case. A financial market is efficient in its weak form if no deterministic pattern can be identified in its time-series behaviour. This indicates that there is no way to achieve abnormal profits by exploiting historical data through arbitrage (Fama, 1965a, 1965b, 1970, 1991).

Many researchers have studied the effects of oil price fluctuations on the economy. Hamilton (1983) was the first researcher to establish that oil prices caused a recession after Second World War, and Mork (1989) indicates that oil price volatility impacts the US gross domestic product (GDP). Lee et al. (1995), contend that the impact of oil price changes is more significant in a stable economy than in an economy with fluctuating prices.

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An accurate examination of the extreme risk of tail events and their temporal influence on the market is required for a functional comprehension of the association between oil prices and capital market returns. Given this context, the goal of this research is to assess the efficiency of capital markets in the Netherlands (AEX), Belgium (BEL 20), France (CAC 40), Portugal (PSI 20), Norway (OBX), and WTI oil index, as well as to assess the shocks arising from oil prices and European stock indexes according to the existing literature, variations in oil prices that impact the behaviour of investors in listed businesses across all relevant industries, influencing stock prices and increasing the risk spread.

In light of the events of 2020 and 2022, this study analysis contributes to the body of knowledge on the persistence and co-movement of European capital markets and the WTI. Several studies have examined the impact of the global pandemic and the oil price war between Russia and Saudi Arabia on financial markets (Dias et al., 2022; Guedes et al., 2022; Horta et al., 2022; Teixeira et al., 2022; Zebende et al., 2022), but we believe this is the first to look at the impact of Russia's invasion in 2022.

2. LITERATURE REVIEW

One of the most significant economic and financial theories examined over the last century is the EMH (Efficient Market Hypothesis). EMH is based on traditional financial theory, such as the arbitrage principle (Modigliani & Miller, 1958, 1959, 1963; Miller, 1988), the portfolio principle (Markowitz, 1952), the capital asset pricing model (Sanvicente et al., 1963; Treynor, 1961), arbitrage pricing theory (Ross, 1976), and option pricing theory (Black & Scholes, 1973). Furthermore, Adam Smith (Barma & Vogel, 2021) argued that while trading in the stock market, a sensible economic individual will always seek maximum profitability.

2.1. Empirical Studies on the Efficient Market Hypothesis (EMH)

Smith and Ryoo (2003) tested whether European capital markets such as Greece, Hungary, Poland, Portugal and Turkey follow the random walk hypothesis. The authors demonstrate that the efficiency hypothesis is rejected in four markets due to the autocorrelation of returns, except for the Istanbul stock index. Later, Narayan and Smyth (2006) extended their prior 2005 work by employing various unit root econometric models to test the random walk hypothesis in 15 European stock markets. The authors suggest that stock prices are defined by the random walk hypothesis.

Dias et al. (2020) investigated the predictability of capital market returns from December 2019 to May 2020 in Belgium (BEL 20), France (CAC 40), Germany (DAX 30), USA (DJ), Greece (Athex 20), Spain (IBEX 35), Ireland (ISEQ), Portugal (PSI 20) and China (SSE). The authors show mixed confirmations of the EMH; the hypothesis is rejected in the US, China, and Portugal markets, and partially rejected in Belgium, France, Greece, and Germany; however, they show that the efficiency hypothesis is not rejected in the markets of Spain and Ireland. In addition, the author Karasiński (2020) analysed the efficiency, in its weak form, in 20 capital markets in Europe over 20 years (1999-2018), and the results show that overall efficiency tended to improve, but only from the end of the global crisis of 2008.

Santos et al. (2020) employed the econophysical model DFA (Detrended Flutuaction Analysis) to assess persistence in the capital markets of Argentina, Brazil, Chile, Colombia, Peru,

and Mexico, from January 2018 to July 2020. The authors demonstrate the presence of long memory, namely in the markets of Colombia (0.72), Chile (0.66), Brazil (0.58) and Peru (0.57); nonetheless, the Mexican market already exhibits anti persistence, although the efficiency hypothesis is not refuted in the market of Argentina. Meanwhile, the authors Dias, Heliodoro, et al. (2021) analysed the exchange markets of Indonesia, Philippines, Singapore, Thailand, UK, USA, and the Eurozone, from September 3rd, 2018, to October 20th, 2020, and assessed the efficient market hypothesis. The authors' evidence that the analysed markets have long memory before and throughout the 2020 worldwide pandemic, indicates investors overreact to prices that reach the markets. Dias, Alexandre, et al. (2021) tested the presence of long memories in the capital markets of China, Japan, South Korea, Philippines, Indonesia, as well as in commodity markets such as platinum (London Platinum Free Market $/Troy oz), gold (Gold Bullion LBM $/t oz DELAY), SILVER (Silver - Zurich SW. francs/kg), in the period from January 2019 to October 2020. The findings showed the existence of long memory in the capital and commodities markets studied, implying that prices do not follow a random walk and exhibit predictability, which might be beneficial to investors operating in these markets. Author Schadner (2021), on the other hand, examined the temporal persistence of the European and US markets and discovered anti persistence, defined as a general propensity for investors to overreact to market information. Thus, investor fear is associated with overreaction, whereas optimism is associated with the random walk theory.

In more recent studies, the authors, Guedes et al. (2022), analysed efficiency, in its weak form, in the G20 capital markets, from January 2nd, 2000, to February 5th, 2021, and the results mostly show that the analysed markets show signs of predictability in their returns, that is, historic prices help predict future prices due to autocorrelation in the residuals. In addition, Zebende et al. (2022) investigated efficiency in G20 markets, but they employed intraday (hourly) data and separated the sample into two distinct time scales: period I, with a time scale of fewer than five days, and period II, with a time scale of more than ten days. The authors demonstrate that for periods shorter than 5 days, stock markets tend to be efficient, while for periods longer than 10 days, the capital markets analysed tend to be (in)efficient. In turn, Dias et al. (2022) tested the random walk hypothesis in African, US, UK, and Japanese capital markets from September 2nd, 2019, to September 2nd, 2020, suggesting that returns are autocorrelated, and that past price series help in the formation of future prices.

2.2. Empirical Studies about Co-Movements Between Capital Markets

Understanding the international linkages between financial markets during times of financial crisis is important for investors, fund managers and academics, in a variety of ways, including portfolio diversification (Kumar, 2017; Sheik & Banu, 2015).

Ftiti et al. (2016) investigated the co-movements of oil markets and G7 capital markets and found evidence that the interdependence between oil prices and the stock market is more pronounced in the short and medium term than in the long term. Moreover, we prove that stock markets are more vulnerable to oil shocks caused by demand shocks. In addition, Jiang et al. (2017) evaluated the impact of the 2008 financial crisis on 6 major stock markets, using the vector autoregression model (VAR) and performing Granger causality tests. The authors show that the financial crisis enhanced the interdependence relationship of global stock markets. However, the general co-movements of global stock markets endure even after the crisis and continue to be stronger in some economies. Whereas author Bein (2017) analyses the co-movements

between 3 Baltic stock markets (Estonia, Latvia and Lithuania) and 1 international crude oil index (Brent and West Texas Intermediate -WTI), 2 major oil importing (EU and UK) and oil exporting (Norway and Russia) countries between January 3rd, 2000, and January 18th, 2016. The author demonstrates that the Baltic capital markets have lower co-movements with the oil indexes and that there are strong co-movements between the oil importing and exporting markets and the WTI and Brent indexes.

Later, Bagheri and Ebrahimi (2020) found shocks between the DAX-CAC 40, FTSE 100-CAC 40 and S&P 500 stock indexes, with the S&P TSX index causing the most. WTI crude oil, Brent crude oil, 30-year sovereign bonds, and 10-year bonds, on the other hand, show significant co-movements. On the other side, cryptocurrencies contribute insignificantly to other markets and are highly integrated. While the authors Dias, Santos, et al. (2021) analysed the co-movements between the capital markets of Hungary (BUX), Croatia (CROBE), Russia (MOEX), Czech Republic (PRAGUE), Slovakia (SAX 16), Slovenia (SBI TOP), Bulgaria (SOFIX), and the WTI oil index, they discovered that the shocks are bidirectional.

In more recent studies Ali et al. (2022) investigated the co-movements between the crude oil futures market and the stock markets of the United States (US), Canada, China, Russia and Venezuela before and during the COVID-19 pandemic. The authors emphasize that the co-movements between the markets were significant from March 2020 to May 2020, and the data also demonstrate significant bidirectional causation from oil to stock markets and vice versa during the Russia-Saudi oil price war. In addition, the author Chkili (2022) examined the linkages between gold, oil, prices, and the Islamic stock market in the turbulent period from 1996 to 2020, which includes the pandemic crisis of 2020. The empirical findings are summarized as follows: (i) There are some significant relationships between capital and commodity markets. (ii) The sign of the linkages varies significantly across markets and regimes. (iii) There is a significant and positive link between oil and Islamic stock markets, particularly during turbulent periods (iv) The negative or absence of relationships between the gold market and Islamic oil and stock markets indicate that gold can act as a hedge and safe haven during extreme market conditions.

In summary, this study aims to contribute to providing information to investors and regulators in European capital markets where individual and institutional investors seek diversification benefits. As a result, the purpose of this research is to investigate the predictability and the co-movements of the European stock indexes and the WTI, to determine if the increase/decrease in efficiency causes shocks between the markets under consideration.

3. DATA

For the period September 18th, 2017, to September 15th, 2022, the data used for the paper were the (daily) prices index of the capital markets of the Netherlands (AEX), Belgium (BEL 20), France (CAC 40), Portugal (PSI 20), Norway (OBX), and the WTI (West Texas Intermediate) oil index. To increase the research's robustness, the sample was partitioned into two sub-periods: the Tranquil sub-period, which lasted from September 18th, 2017, to December 31st, 2019, and the Crisis period, which lasted from January 1st, 2020, to September 15th, 2022 (2020 global pandemic and Russian invasion of Ukraine in 2022). The Thomson Reuters Eikon platform was utilized as the information source, and the price index is in local currency.

Table 1. Indexes and countries under analysis in this paper

Index	Country
AEX	Holland
BEL 20	Belgium
CAC 40	France
OBX	Norway
PSI 20	Portugal
WTI	West Texas Intermediate - EUA

Source: Own elaboration

4. METHODOLOGY

The research will be carried out in stages. The sample will be characterized using descriptive statistics to determine if the data follows a normal distribution. We will utilize the panel unit roots tests of Breitung (2000), and Levin et al. (2002) to ensure that the time series follows white noise (mean = 0; constant variance). The null hypothesis of the Levin et al. (2002) test is that all panels contain a unit root (or unstable variance). Hadri (2000), on the other hand, presupposes the existence of panels that are (trend) stationary (i.e. there is no unit root in the panel data, common to all sections) versus the alternative hypothesis that at least one panel contains a unit root. We will utilize the non-parametric test by Wright (2000) to address the study objectives since it is more robust to time series that do not exhibit normality and is fairly consistent when they present serial correlation. This author's technique includes two sorts of tests: the rankings test for homoscedastic series and the signs test for heteroscedastic series. The variance ratio is given by the relationship between the variance of q periods and that of a single period, which is equal to 1. Thus, in the variance ratio test, under the null hypothesis VR(q) = 1, the series follows a random walk type process. When the randomness hypothesis is rejected and VR(q) >1, the series implies the presence of positive correlation. When the null hypothesis is rejected and VR(q) < 1, the series exhibit a negative serial correlation. In the short term, we will use the *VAR Granger Causality/Block Exogeneity Wald Tests* methodology to assess and evaluate shocks (co-movements) between markets. This methodology employs the Wald statistic, which tests whether the null hypothesis that the coefficients of the endogenous variables lagging the "cause" variable are null or do not "cause" in the Grangerian sense the dependent variable. However, because the result of this test is strongly dependent on the number of lags incorporated in the model, the primary focus should be to appropriately estimate this value in order to acquire solid evidence (Gujarati, 2004). Furthermore, we utilize the LR test statistic (each test at 5% level) to select the amount of lags to include in the causality tests, and we use the VAR Residual Serial Correlation LM Tests to examine the model's robustness.

5. RESULTS

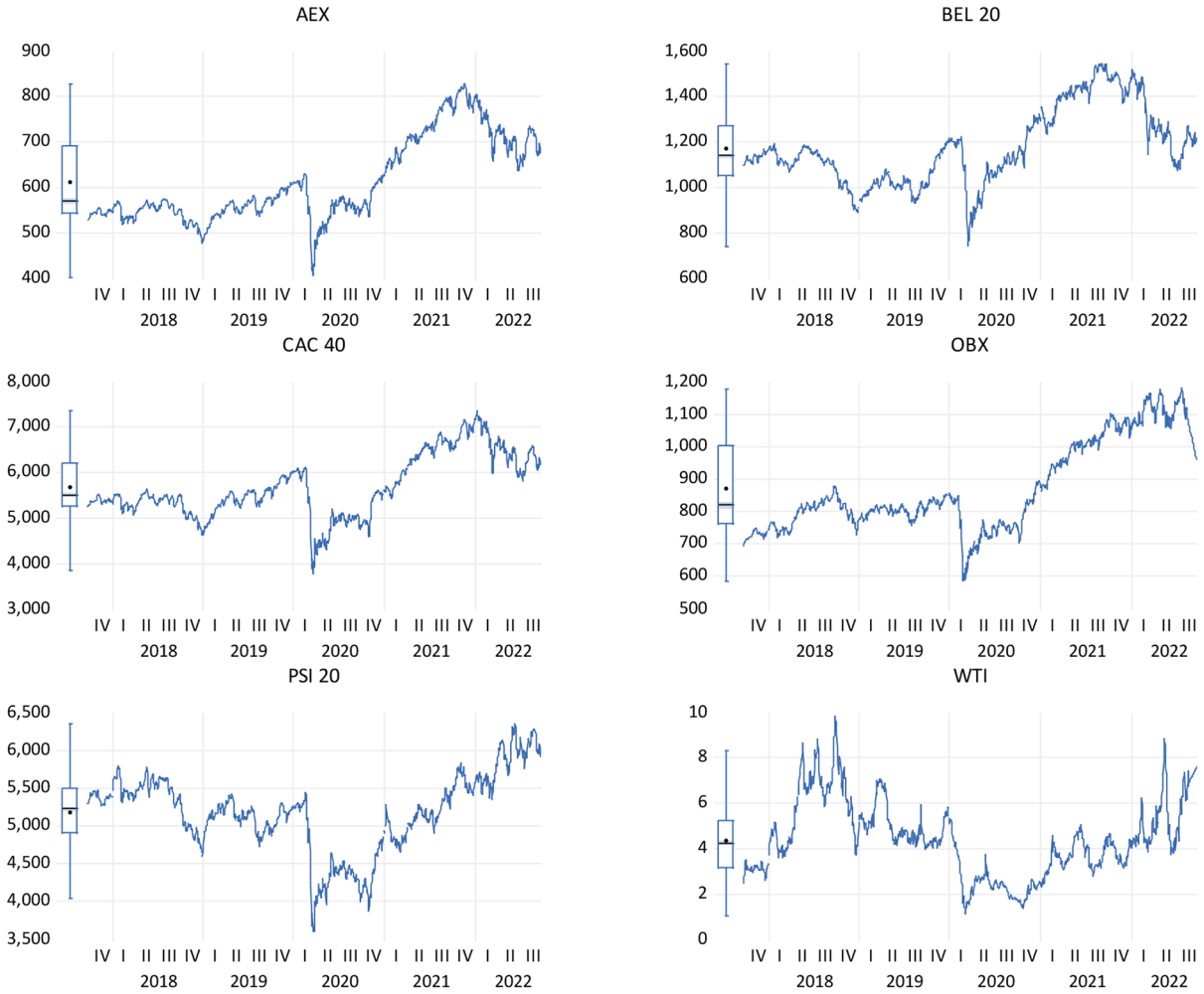
A chart of level evolution, in returns, was created to analyse the behaviour of time series across the period under consideration. We applied the natural logarithm to convert the original time series prices into returns, due to their statistical qualities like the stationarity characteristic, which is not typically found in the original price series (Tsay, 2002).

Figure 1 shows a graphical representation of the evolution, in levels, of the financial markets under analysis. The AEX (Netherlands), BEL 20 (Belgium), CAC 40 (France), OBX (Norway) and PSI 20 (Portugal) stock market evolution, as well as the WTI oil index, are represented. The sample period spans September 2017 to September 2022, allowing us to study the pre-crisis

period as well as the two highly complex periods marked by the pandemic crisis and the Russian invasion of Ukrainian territory. A total of 1280 observations were considered in each market, corresponding to the daily prices in the period under study, i.e. from September 15th, 2017, to September 18th, 2022.

In terms of the trajectory of stock market returns, it is clear that when the Covid-19 pandemic was announced in the second and third quarters of 2020, there were substantial structural breaks. The same can be seen in a review of WTI's behaviour during this period, which breaks in comparison to the stock markets in a far more significant way. This influence on WTI can be explained by the immediate impacts of disease control efforts (paralysis of productive and economic activities and confinement of the global population).

In terms of the stock market and WTI behaviour, oscillations can be seen at the start of 2022, with Russia's invasion of Ukraine, indicating the presence of structural breaks. Even so, when we compare the impact of the pandemic crisis with the Russian invasion of Ukraine on the breakdown of financial markets, we see that the 2020 crisis triggered much more volatile behaviour in the evolution of time series due to the uncertainty that was felt and the total ignorance of the disease.



Note: Data processed by the authors (software: Eviews12)

Figure 1. Evolution, in levels, of the financial markets under analysis, from September 18th, 2017, to September 15th, 2022.

Source: Own elaboration

Statistical metrics such as the arithmetic mean, standard deviation, asymmetry, and kurtosis coefficients were derived to characterize the sample under investigation and, in particular, to explain the distribution of time series data. The arithmetic mean is a representative measure of the central tendency of the time series distribution under consideration, and the standard deviation measures the degree of data dispersion concerning the mean, so in theory, this statistical parameter provides insight into the projection of future risks in investment. In this perspective, the lower the degree of dispersion, the lower the volatility relative to the standard value, and hence the lower the projection of the inherent risk of the investment. In contrast, given the use of econometric models, the investigation and validation of the data normality assumption are critical in the estimation, inference, and forecasting procedures. To that purpose, the asymmetry and kurtosis coefficients of time series were computed, which are commonly employed as diagnostic tools for the application of econometric models and the investigation of significant financial difficulties (Bastianin, 2019; Bontemps & Meddahi, 2005).

Table 2 includes a description of the descriptive data as well as the results of the Jarque and Bera goodness of fit test applied to the financial markets under consideration, namely the AEX (Netherlands), BEL 20 (Belgium), CAC 40 (France), OBX (Norway), PSI 20 (Portugal), and WTI.

Except for the BEL 20 and PSI 20 stock market indexes, it can be observed that the majority of the returns have positive daily averages that are quite near zero. The commodity under consideration (WTI) has the greatest average daily return (0.000882) as well as the most significant standard deviation (risk) (0.05088). The PSI 20 is the least risky of the stock market indexes examined (0.010942). In terms of asymmetry, all of the stock market indexes under consideration have SK < 0, indicating that the distribution of time series data is asymmetrical to the left. Besides the French stock market index (CAC 40), this asymmetry is moderate for all stock market indexes. The CAC 40 presents SK > 1, which leads us to characterise its asymmetry coefficient as strong. Regarding the WTI, its asymmetry coefficient is positive to the right and can be characterised as moderate.

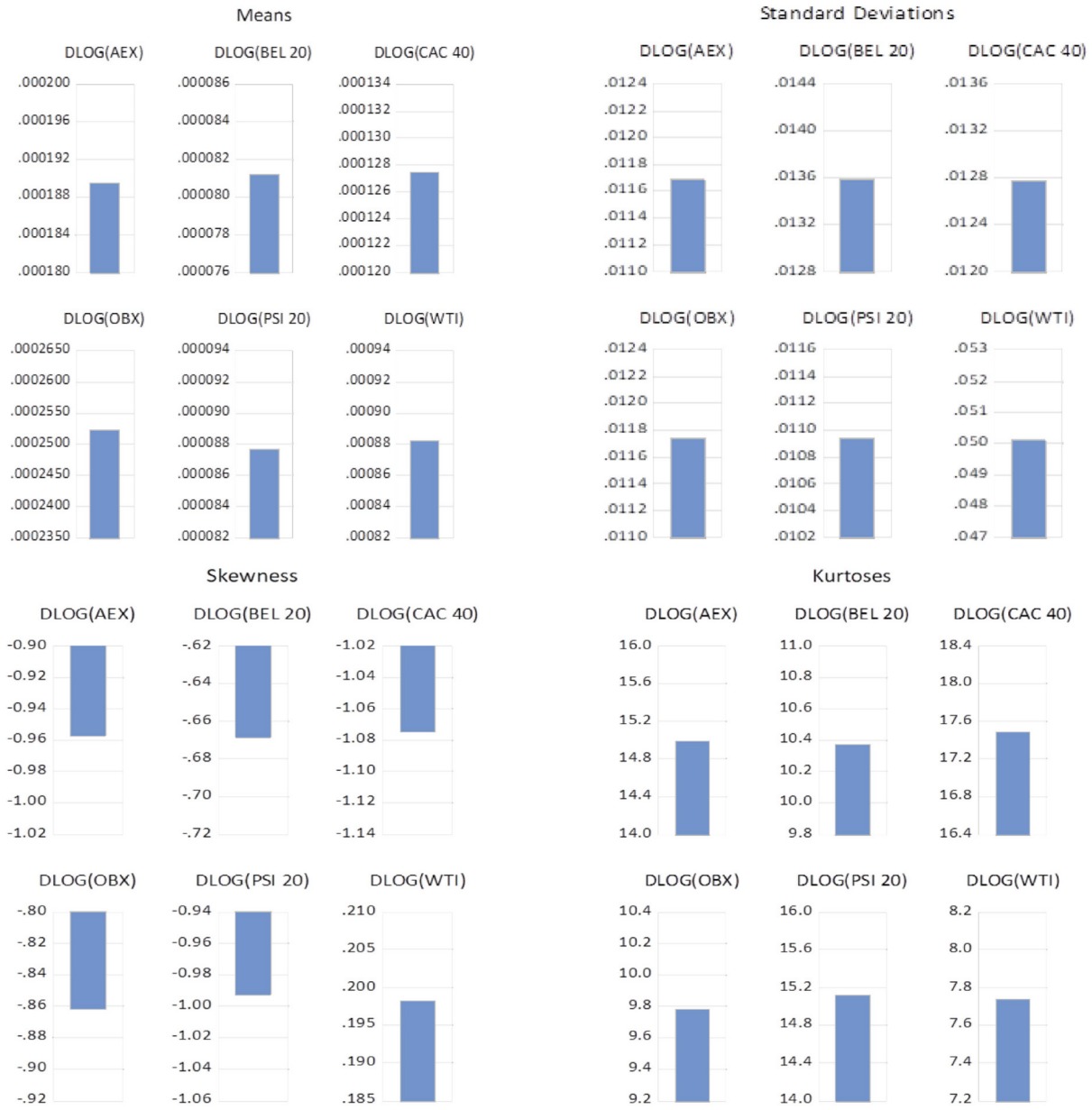
In turn, the kurtosis study reveals that the values for all of the financial markets under consideration are more than 3. The results show that the time series under examination do not have a perfectly normal distribution. Jarque and Bera's adherence test was used for validation. The acquired values resulted in the rejection of the null hypothesis (at a significance level of 1%), confirming what had previously been revealed about the non-normal distribution of time series.

Table 2. Descriptive statistics, in terms of returns, for the financial markets under analysis, from September 18th, 2017, to September 15th, 2022.

	AEX	BEL 20	CAC 40	OBX	PSI 20	WTI
Mean	0.000189	8.12E-05	0.000127	0.000252	8.76E-05	0.000882
Std. Dev.	0.011682	0.013581	0.012773	0.011736	0.010942	0.050088
Skewness	-0.957693	-0.668776	-1.075170	-0.862261	-0.993261	0.198319
Kurtosis	14.99638	10.38281	17.49855	9.792496	15.13170	7.743224
Jarque-Bera	7871.026	3002.394	11457.70	2619.305	8059.975	1208.293
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	1280	1280	1280	1280	1280	1280

Note: Data processed by the authors (software: Eviews12)
*** represent the rejection of the null hypothesis at a significance level of 1%.

Source: Own elaboration



Note: Data processed by the authors (software: Eviews12)

Figure 2. Graphs of descriptive statistics, in returns, concerning the financial markets under analysis, from September 18th, 2017, to September 15th, 2022.

Source: Own elaboration

A stationary stochastic process's variables have a limited mean and variance that remains constant over time, as well as covariances that rely only on the temporal interval between observations. In recent years, it has been observed that the behaviour of time series does not appear to correspond to so-called stochastic stationary processes, so it has been deemed necessary to test each series in the sample to identify the presence of autoregressive unit roots in the series data, as these can cause major problems for the empirical work (Granger & Newbold, 1974; Tahai et al., 2004), namely, obtaining spurious regressions (Herranz, 2017; Van Greunen et al., 2014).

Individual and panel tests are available to detect the existence of unit roots in time series data. We will employ the panel unit root tests proposed by Hadri (2000), and Levin et al. (2002). The null hypothesis of the Levin et al. (2002) test is that all panels contain a unit root (or unstable variance).

Hadri (2000), on the other hand, proposes a test in which the null hypothesis presupposes the existence of panels that are (trend) stationary (that is, there is no unit root in the panel data that is common to all sections) versus the alternative hypothesis that at least one panel contains a unit root.

The LLC test result is shown in Table 3 and implies that the null hypothesis should be rejected in the first differences for each of the tests at a significance level of 1%. Hadri's test was used for validation, and the statistical result is shown in Table 4. It leads to the non-rejection of the null hypothesis (at a significance level of 1%), confirming what was previously stated, that all panel time series are stationary in first differences.

Table 3. Levin et al. (2002) test for the financial markets under analysis from September 18th, 2017, to September 15th, 2022.

Null Hypothesis: Unit root (common unit root process)

Method			**Statistic**			**Prob.****
Levin, Lin & Chu t*			-151.876			0.0000
** Probabilities are computed assuming asymptotic normality.						
Intermediate results on D(UNTITLED)						
Series	**2nd Stage Coefficient**	**Variance of Reg**	**HAC of Dep.**	**Lag**	**Max Lag**	**Bandwidth**	**Obs**
AEX	-1.00760	47.720	1.7419	0	22	56.0	1278
BEL 20	-0.97344	230.98	5.3183	0	22	90.0	1278
CAC 40	-0.99763	4678.4	216.62	0	22	42.0	1278
OBX	-1.04264	97.842	9.2226	0	22	20.0	1278
PSI 20	-0.94806	2838.0	297.84	0	22	18.0	1278
WTI	-0.95540	0.0471	0.0030	0	22	31.0	1278
	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-0.98745	-86.456	1.001	-0.500	0.500		7668

Note: Data processed by the authors (software: Eviews 12)
** Probability is assumed to be asymptotically normal.

Source: Own elaboration

Table 4. Hadri (2000) test for the financial markets under analysis, from September 18th, 2017, to September 15th, 2022.

Null Hypothesis: Stationarity

Method	Statistic	Prob.**
Hadri Z-stat	-1.41734	0.9218
Heteroscedastic Consistent Z-stat	-0.21960	0.5869

* Note: High autocorrelation leads to severe size distortion in Hadri test, leading to over-rejection of the null.
** Probabilities are computed assuming asymptotic normality
Intermediate results on D(UNTITLED)

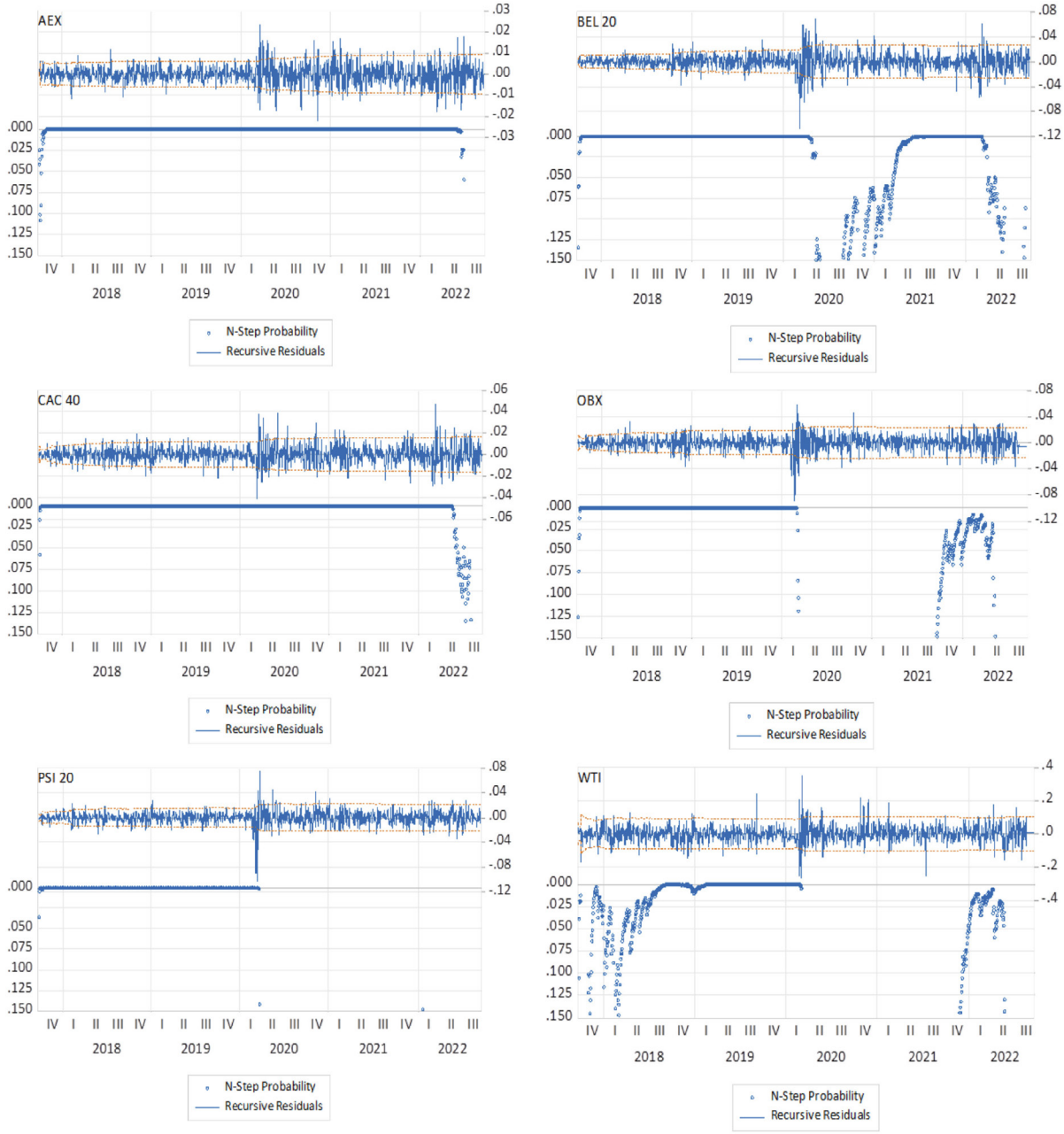
Series	**LM**	**Variance HAC**	**Bandwidth**	**Obs**
AEX	0.0638	52.06510	9.0	1279
BEL 20	0.0726	253.6324	6.0	1279
CAC 40	0.0454	5249.428	9.0	1279
OBX	0.0874	95.83183	15.0	1279
PSI 20	0.0347	3636.980	12.0	1279
WTI	0.0737	0.059496	13.0	1279

Note: Data processed by the authors (software: Eviews 12)
** Probability is assumed to be asymptotically normal.

Source: Own elaboration

Figure 3 depicts the stability tests performed on the residuals of the financial markets under consideration, namely the AEX (Netherlands), BEL 20 (Belgium), CAC 40 (France), OBX (Norway), and PSI 20 (Portugal) stock market indexes, as well as the WTI oil index, from

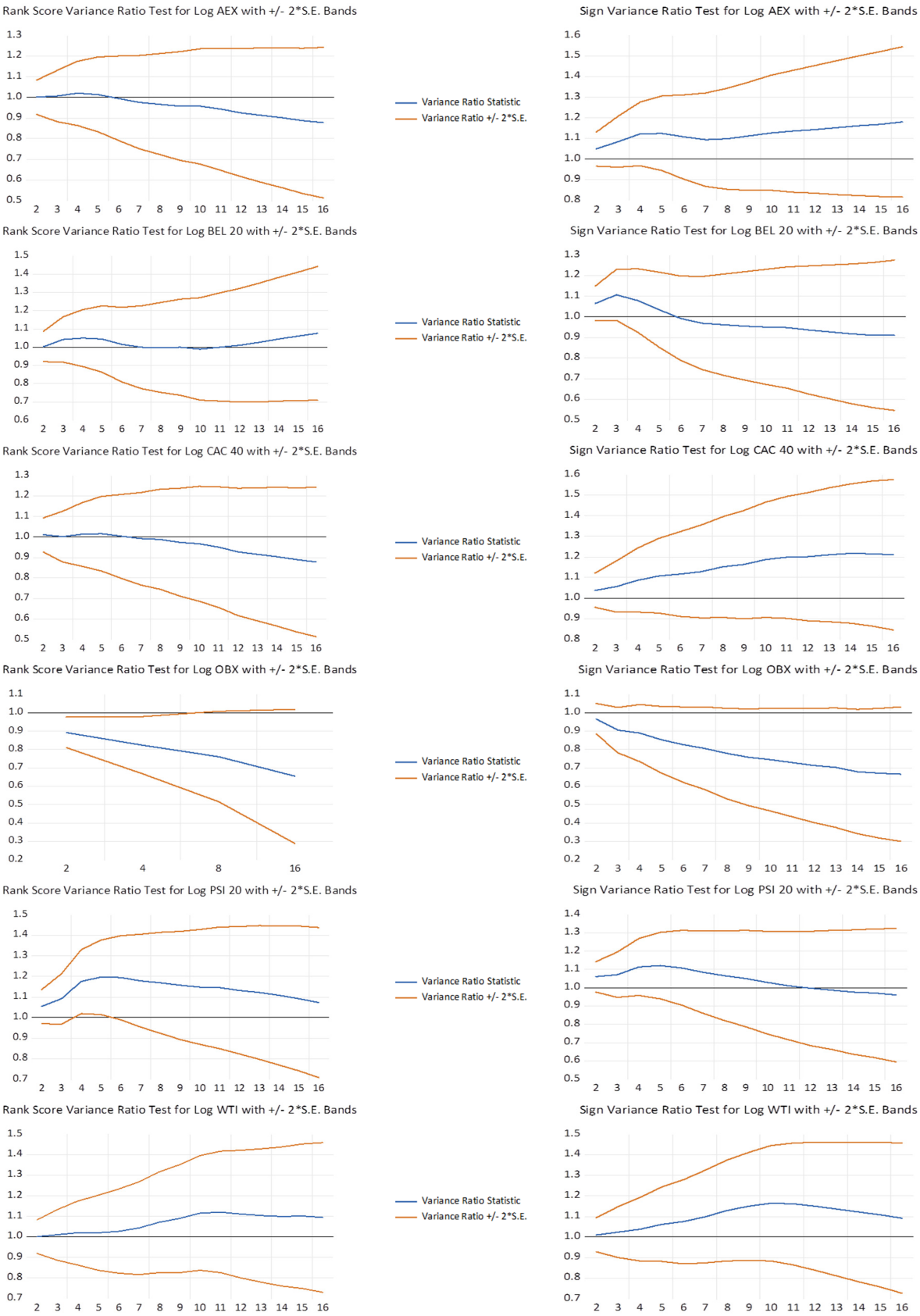
September 18th, 2017, to September 15th, 2022. The application of this test has a potentially similar effect to identifying the presence of unit roots in the observable components of the time series, and its application is especially important during periods of high complexity and uncertainty in financial markets, such as the occurrence of the COVID-19 pandemic crisis and the Russian invasion of Ukraine in 2022, because they can cause significant structural breaks in the evolution of the time series. By examining each graph, it is feasible to deduce a breach of the 95% probability boundaries and disruptions in the variance, particularly during the first and second quarters of 2020 and 2022, indicating that the time series under study had volatile evolutionary behaviour.



Note: Data processed by the authors (software: Eviews12)

Figure 3. Stability tests applied to the financial markets under analysis, from September 18th, 2017, to September 15th, 2022.

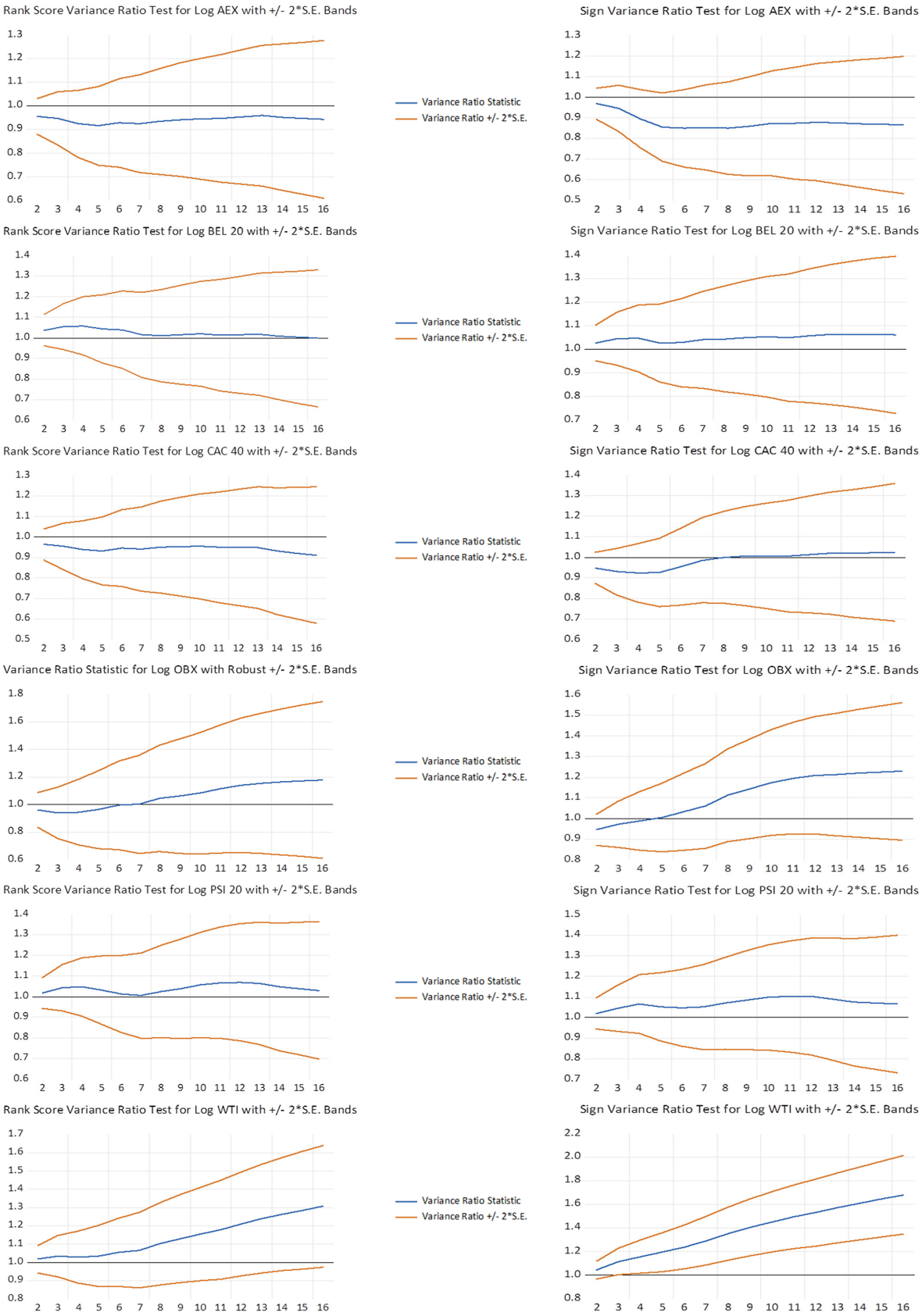
Source: Own elaboration



Note: Data processed by the authors (software: Eviews12)

Figure 4. Variance Ratios in Ratios and Signals through the Wright (2000) methodology, applied to the financial markets under analysis, in the Tranquil period

Source: Own elaboration



Note: Data processed by the authors (software: Eviews12)

Figure 5. Variance Ratios in Ratios and Signals using the Wright (2000) methodology, applied to the financial markets under analysis, in the Stress period

Source: Own elaboration

This paper proposes using variance tests based on time series Rankings and Signs to test the null hypothesis of random walk and martingale in two sub-periods, namely the "Tranquil" period, which runs from September 18th, 2017, to December 31st, 2019, and the "Stress" period, which runs from January 1st, 2019, to September 15th, 2022. The assumption of homoscedasticity is established through ranking variance tests and the Signs test determines the existence of heteroscedasticity. The data were generated for lags ranging from 2 to 16 days in both situations. In the Tranquil sub-period (Figure 4), we can see that the random walk (homoscedastic) and martingale (heteroscedastic) hypotheses are not rejected in their majority. We can see that the indexes AEX, BEL 20, and CAC 40 present a tendency towards equilibrium, despite the existence of periods of non-adjustment of the information that arrives at the market, as evidenced by the martingale hypothesis. The stock indexes OBX, PSI 20, and WTI exhibit informational imbalances, or investor overreaction to the arrival of new information in the market. These findings are supported by the authors Vasco et al. (2021), and Dias, Alexandre, et al. (2021), who demonstrate that excessive investor reactions produce market imbalances. The stock indexes OBX, PSI 20, and WTI exhibit informational imbalances, or investor overreaction to the arrival of new information in the market.

Figure 5 depicts the non-parametric test of Rankings and Signals developed by Wright (2000) and applied to the capital markets of AEX (Netherlands), BEL 20 (Belgium), CAC 40 (France), OBX (Norway), and PSI 20 (Portugal) during the Stress period. Based on the results, we can conclude that the global pandemic of 2020 and the Russian invasion in 2022 had a significant impact on the memory properties in the analysed markets. For example, the indexes AEX and WTI show signs of (in)efficiency for the hypotheses random walk and martingale, that is, the series do not cross the variance ratio of 1 in the 16 days of lag, whereas the indexes OBX and PSI 20 show periods (days) of adjustment, but in their majority, the hypotheses of equilibrium are rejected. The BEL 20, and CAC 40 indexes, on the other hand, indicate periods of equilibrium, implying that investors reacted more calmly to the global economic uncertainties. This data is supported by the authors Teixeira et al. (2022), Zebende et al. (2022), Dias et al. (2022), Guedes et al. (2022), who demonstrate that during times of stress and uncertainty in the global economy, markets tend to (in)efficiency.

The Granger causality technique was utilized in this paper to explore the architecture of the causal linkages of the time series under consideration during the two sub-periods examined in the sample. This method, by estimating an Autoregressive Vector (VAR), identifies the direction of causality, that is, it calculates for which values a given time series gives statistically significant information using the F-statistic test (predictive capacity). We utilized the criteria described in Tables 5 and 6 to determine the optimal number of lags for the estimation of the VAR model for the Stress and Tranquil phases. Based on the LR criteria, the results indicate a model that accounts for 10 lags during the Tranquil Period. We should estimate a model with a 6-day lag for the Stress period, taking into consideration the LR information criteria.

The autocorrelation test of serial residuals was calculated to determine if the models predicted for the two sub-periods of the sample are the most appropriate. Table 7 provides the test findings for the Tranquil period and indicates that for lags equal to 10, the null hypothesis is true, dismissing the possibility of residual autocorrelation.

Based on the data in Table 8, the findings for the Stress period led us to dismiss the probability of residual autocorrelation when constructing a model with 7-day delays (lags). This ensures the robustness and validity of the models estimated for the Tranquil and Stress periods.

Table 5. VAR Lag Order Selection Criteria for the Tranquil period

Lag	LogL	LR	FPE	AIC	SC	HQ
0	11396.81	NA	2.18e-25	-39.75850	-39.71294*	-39.74072
1	11437.73	80.84823	2.14e-25	-39.77568	-39.45677	-39.65128
2	11590.74	299.0645	1.42e-25*	-40.18407*	-39.59181	-39.95304*
3	11619.76	56.12065	1.46e-25	-40.15972	-39.29410	-39.82206
4	11655.44	68.24069	1.46e-25	-40.15859	-39.01962	-39.71430
5	11673.39	33.96185	1.56e-25	-40.09560	-38.68327	-39.54468
6	11693.53	37.68476	1.65e-25	-40.04025	-38.35457	-39.38270
7	11720.89	50.61373	1.70e-25	-40.01009	-38.05106	-39.24591
8	11752.62	58.02820	1.72e-25	-39.99518	-37.76279	-39.12437
9	11771.62	34.34792	1.83e-25	-39.93583	-37.43009	-38.95840
10	11805.49	60.53797*	1.85e-25	-39.92842	-37.14932	-38.84435

Note: Data processed by the authors (software: Eviews12)
***** Indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level). FPE: Final prediction error. AIC: Akaike information criterion. SC: Schwarz information criterion. HQ: Hannan-Quinn information criterion.

Source: Own elaboration

Table 6. VAR Lag Order Selection Criteria for the Stress period

Lag	LogL	LR	FPE	AIC	SC	HQ
0	11595.01	NA	8.97e-23	-33.73802	-33.69844	-33.72271
1	11626.34	62.02459	9.10e-23	-33.72443	-33.44734	-33.61723
2	11957.49	649.7597	3.85e-23	-34.58366	-34.06907*	-34.38457*
3	12005.12	92.63578	3.72e-23	-34.61753	-33.86544	-34.32656
4	12031.81	51.44095	3.83e-23	-34.59044	-33.60084	-34.20757
5	12076.86	86.03366	3.73e-23	-34.61678	-33.38969	-34.14203
6	12114.58	71.36419	3.71e-23*	-34.62177*	-33.15717	-34.05513
7	12149.28	65.06016	3.73e-23	-34.61799	-32.91589	-33.95946
8	12179.43	56.00577	3.79e-23	-34.60097	-32.66137	-33.85055
9	12197.52	33.27434	4.00e-23	-34.54882	-32.37171	-33.70651
10	12232.45	63.66747*	4.01e-23	-34.54572	-32.13111	-33.61152

Note: Data processed by the authors (software: Eviews12)
***** Indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level). FPE: Final prediction error. AIC: Akaike information criterion. SC: Schwarz information criterion. HQ: Hannan-Quinn information criterion.

Source: Own elaboration

Table 7. VAR Residual Serial Correlation LM Tests for the estimated model corresponding to the Tranquil period

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	36.81453	36	0.4310	1.023256	(36, 2202.8)	0.4310
2	42.46106	36	0.2125	1.181707	(36, 2202.8)	0.2126
3	31.32375	36	0.6905	0.869561	(36, 2202.8)	0.6906
4	36.40225	36	0.4499	1.011703	(36, 2202.8)	0.4500
5	34.34499	36	0.5474	0.954083	(36, 2202.8)	0.5475
6	40.05961	36	0.2948	1.114269	(36, 2202.8)	0.2948
7	37.32815	36	0.4079	1.037652	(36, 2202.8)	0.4079
8	42.62957	36	0.2074	1.186442	(36, 2202.8)	0.2074
9	25.97382	36	0.8912	0.720175	(36, 2202.8)	0.8912
10	26.72539	36	0.8694	0.741139	(36, 2202.8)	0.8694
11	43.87167	36	0.1724	1.221354	(36, 2202.8)	0.1724

Note: Data processed by the authors (software: Eviews12)

Source: Own elaboration

Table 8. VAR Residual Serial Correlation LM Tests
for the estimated model corresponding to the Stress period

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	61.29030	36	0.0054	1.710701	(36, 2826.4)	0.0054
2	73.43962	36	0.0002	2.054207	(36, 2826.4)	0.0002
3	50.21513	36	0.0581	1.398841	(36, 2826.4)	0.0581
4	66.24049	36	0.0016	1.850484	(36, 2826.4)	0.0016
5	57.37492	36	0.0132	1.600311	(36, 2826.4)	0.0132
6	69.70779	36	0.0006	1.948538	(36, 2826.4)	0.0006
7	62.85299	36	0.0037	1.754802	(36, 2826.4)	0.0037

Note: Data processed by the authors (software: Eviews12)

Source: Own elaboration

The Granger test was then used to see if the prediction ability of market X values concerning market Y is statistically significant. Table 9 shows the results of the Granger Causality / Block Exogeneity Wald Tests performed on the financial markets under study, namely AEX (Holland), BEL 20 (Belgium), CAC 40 (France), OBX (Norway), PSI 20 (Portugal), and WTI, for the Tranquil period, and we can confirm the presence of 18 shocks between markets (in 30 possible ones). The CAC 40, PSI 20, and AEX indexes, in particular, exhibit four co-movements (out of five potential ones), while the BEL 20 and WTI indexes cause shocks in three and two markets, respectively, with the OBX index causing the fewest shocks in the markets studied (1 in 5 possible ones). In addition, we verified that the WTI index is the market that absorbs the most shocks from the capital markets under consideration, implying that the WTI does not exhibit the characteristics of a safe haven during this time of market calm.

Table 9. Granger causality/Block Exogeneity Wald Tests,
of the financial markets under analysis, in the Tranquil period

	BEL 20	CAC 40	OBX	PSI 20	AEX	WTI
BEL 20		**31,2685*** **	0,57987	**16,1699*** **	**26,5415*** **	**2,34017** **
CAC 40	0,44782		0,68482	**1,63420***	0,78457	0,75544
OBX	**5,73288*** **	**11,0757*** **		**7,51031*** **	**9,52059*** **	**4,47908*** **
PSI 20	**1,63132***	**2,40250*** **	0,79824		**2,39273*** **	0,82226
AEX	0,74365	0,88038	0,61863	1,01556		0,63722
WTI	**1,97215** **	**3,00972*** **	**2,30338** **	**3,36027*** **	**2,71430*** **	

Note: Data processed by the authors (software: Eviews12)
Markets in column "cause" markets in row. The asterisks ***, **, * indicate the significance of the statistics at 1%, 5% and 10%, respectively.

Source: Own elaboration

Table 10 displays the results of the VAR Granger Causality test for the Stress period, revealing the presence of 17 shocks (in 30 possible ones). WTI is the market that causes the most market shocks (5 out of 5 possibilities), while the indexes BEL 20, OBX cause shocks in three markets (in 5 possible). The CAC 40, PSI 20, and AEX indexes have two causal relationships with their peers, whereas the WTI index receives the most shocks from its peers. Overall, the CAC 40, PSI 20, and AEX indexes reduced their co-movements with other markets (from 4 to 2), but the WTI index increased from 2 to 5 shocks and the OBX index increased from 1 to 3 co-movements, while the BEL 20 index maintained its co-movements with its peers. These findings are relevant to the existing literature, i.e. market efficiency does not show evidence of any effect on inter-market moves.

Table 10. Granger causality/Block Exogeneity Wald Tests, of the financial markets under analysis, in the Stress Period

	BEL 20	CAC 40	OBX	PSI 20	AEX	WTI
BEL 20		146,966***	1,57248	58,1418***	100,725***	3,32639***
CAC 40	2,17735**		2,04664**	1,14663	1,58489	2,66178**
OBX	1,34470	1,18772		1,59849	1,14341	9,87080***
PSI 20	1,71359	0,57130	2,06165**		1,11314	2,37999**
AEX	2,68896***	0,62635	1,69894	1,43230		2,37853**
WTI	5,73535***	3,47608***	2,62793**	4,02132***	2,87214***	

Note: Data processed by the authors (software: Eviews12)
Markets in column "cause" markets in row. The asterisks ***, **, * indicate the significance of the statistics at 1%, 5% and 10%, respectively.

Source: Own elaboration

6. CONCLUSION

This paper analysed whether the 2020 and 2022 events affected efficiency, and accentuated shocks across markets in the Netherlands (AEX), Belgium (BEL 20), France (CAC 40), Portugal (PSI 20), Norway (OBX), and West Texas Intermediate (WTI) oil index, over the period from September 2017 to September 2022, and the sample was partitioned into two sub-periods: from September 18th, 2017, to December 31st, 2019 - we call it the Tranquil sub-period, while for the period from January 1st, 2020 to September 15th, 2022 we classify it as the Stress period.

To answer the research question if the 2020 and 2022 events caused predictability in the markets under analysis, we estimated the Rankings and Signals time series model to test the random walk and martingale hypotheses. In the Tranquil sub-period, we can see that the random walk (homoscedastic) and martingale (heteroscedastic) hypotheses are not rejected, as the AEX, BEL 20, and CAC 40 indexes show a tendency towards equilibrium, despite periods of non-adjustment of the information that reaches the market, as evidenced by the martingale hypothesis. On the other hand, OBX, PSI 20 and WTI stock indexes exhibit informational imbalances, which are excessive investor reactions to the arrival of new information in the market. In addition, we verify that during the Stress period, the AEX and WTI indexes show signs of (in) efficiency for the random walk and martingale hypotheses, that is, in the 16 days of lag the series do not cross the variance ratio of 1, whereas the OBX and PSI 20 indexes show periods (days) of adjustment, but in their majority, the equilibrium hypotheses are rejected. The BEL 20, and CAC 40 indexes, on the other hand, exhibit periods of equilibrium, suggesting that investors did not overreact to the arrival of new information to the market.

To corroborate the findings, we also investigated whether there was a link between efficiency and an increase in market shocks. To that purpose, we estimated the Granger Causality/ Block Exogeneity Wald Tests model, and during the tranquil sub-period, we identified 18 market shocks (in 30 possible ones). The CAC 40, PSI 20, and AEX indexes exhibit four co-movements (out of 5 possible), while the BEL 20 and WTI indexes create shocks in 3 and 2 markets, respectively, with the OBX index generating the fewest shocks in the markets studied (1 in 5 possible). In addition, we confirmed that the WTI index is the market that absorbs the most shocks from the capital markets under consideration, implying that the WTI does not exhibit the characteristics of a safe haven during the Tranquil period.

We discovered 17 shocks during the Stress sub-period (in 30 possible ones). WTI is the market that creates the most market shocks (5 out of 5 possibilities), whereas the indexes BEL 20, OBX cause market shocks in 3 markets (in 5 possible). The CAC 40, PSI 20 and AEX indexes show 2 causal relations with their peers, whereas the WTI index gets the most shocks from its peers. In general, the CAC 40, PSI 20, and AEX indexes reduced their co-movements with other markets (from 4 to 2), while the WTI index increased from 2 to 5 shocks and the OBX index from 1 to 3 co-movements, while the BEL 20 index maintained its shocks with its peers. Finally, we confirmed that the 2020 and 2022 occurrences caused some predictability in specific markets, but we found no indication that (in)efficiency increased the co-movements between the studied markets.

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Financial Statement Valuations in the Italian Civil Code: Is Fair Value Really So Extraneous to the Historical Cost Tradition?

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Abstract: *The adequacy of the fair value concerning the historical cost is particularly debated in the literature. This study aims to analyze the Italian legislation on financial statements to verify whether the historical cost is so far from current values. The method applied by this study is based on the historical analysis, from 1942 to today, of the provisions of the Italian civil code on financial statements. The study found that, although the historical cost criterion has always been and still is fundamental, the application of fair value is by no means extraneous to Italian accounting tradition.*

1. INTRODUCTION

The debate on the contrast between historical cost and fair value represents a relevant theme in the literature (Jaijairam, 2013; Laux & Leuz, 2009) due to the different effects that each of the two evaluation criteria causes on the representativeness of the financial statements values (Magnan & Parbonetti, 2018). This study aims to analyze the Italian legislation on financial statements to verify whether the historical cost is so far from current values, or, on the contrary, the cases in which it can or must be waived are far from marginal. In general terms, the historical cost criterion in financial reporting is based on the application of past values, originating from transactions that have already taken place. Conversely, fair value accounting refers to the current values and the values that could be formed in transactions yet to be implemented.

The application of fair value has significant implications for the drafters of the financial statements as it requires them to project management into the future and to forecast possible market trends. In the Italian accounting tradition, and more widely in that of the countries of continental Europe, the historical cost is generally considered a primary principle, on which the entire construction of the financial statements and most of the estimating processes are based. In Italy, the centrality of the historical cost dates back at least to the first formulation of the civil code of 1942 and was confirmed in subsequent reforms, up to the first radical one implemented with Legislative Decree No. 127 of 1991. The changes to the financial statements regulation that took place in the following years – first of all, the reform introduced with Legislative Decree No. 6/2003 – only slightly affected the historical cost principle, which continued to be fundamental for over a decade. In the current legal framework, in force since 2016 and resulting from the transposition of Directive 2013/34/EU, the historical cost, while remaining central, has been accompanied by the introduction, for the first time in Italy, of the fair value for the valuation of derivative financial instruments. However, in addition to this regulatory provision, there are many other cases where historical cost is not applicable and this study aims to intercept them.

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The study highlighted how the historical cost continues today to represent a central principle for the preparation of financial statements. However, this does not mean that Italian legislation excludes valuations at current values. On the contrary, such assessments are common but rather different from the Anglo-Saxon fair value in one fundamental aspect: historical values only deviate downwards, i.e. only where the presumed realizable values are lower than the costs incurred. It follows that, in all cases in which the values expressed by the market are lower than those recorded in the financial statements, the historical cost criterion and the fair value should lead, if correctly applied, to the same results.

Alongside the contribution to the theory of financial statements valuations, the study also has practical implications as it highlights the cases in which management must make a forecasting effort to reliably estimate future market values (Bandyopadhyay et al., 2017; Bratten et al., 2012; Liang & Riedl, 2014). The research differs from the traditional literature in demonstrating, unlike the prevailing studies (Demaria & Dufour, 2007; Herrmann et al., 2006), that the historical cost of continental accounting must be understood as a criterion compatible (Strouhal, 2009) and coexisting with fair value, albeit with the specificities highlighted above.

2. LITERATURE REVIEW

The existing literature highlights numerous divergences between historical cost and fair value, attributing them to a markedly different valuation approach. In this regard, Jaijairam (2013) underlines that while the historical cost evaluates the assets and liabilities of the balance sheet at the price incurred when they were purchased or assumed, the fair value expresses the market price at the reference date of the financial statements. It follows that the fair value is often considered a better criterion than the historical cost since, unlike the latter, which refers to past events, it can reflect the current market situation in the financial statements. However, according to Palea (2014), empirical research has brought to light some doubts regarding the effective reliability of fair value, to which must also be added the insufficiency of this criterion concerning stewardship. A dual reporting system, which uses both criteria, would therefore be preferable and more functional to the needs of users.

Khurana and Kim (2003) also make a comparison between fair value and historical cost, in particular referring to bank holding companies, to appreciate whether the former is more informative than the latter in explaining equity values. Their investigation reveals that there are no appreciable differences, while for loans and deposits of small bank holding companies, the historical cost seems to be more informative. On the contrary, Barlev and Haddad (2007) underline the merits of fair value by highlighting how it is more suitable, compared to the historical cost, for achieving international accounting harmonization and thus for obtaining better comparability of company financial statements. This peculiarity is also recognized by Georgiou and Jack (2011), who favor fair value as a criterion that regulates the harmonization of corporate financial statements and favors efficient management. Differently, Krumwiede (2008) observes that, although supporters of fair value consider it capable of producing more timely and relevant information, in many cases only historical cost provides reliable and verifiable information. Kaya (2013) also points out that the transition from historical cost to fair value has introduced greater subjectivity in accounting and believes that the Enron case is an example of how the use of fair value can cause fraud. In this sense, given the ambiguity that characterizes fair value, the historical cost could be useful in preventing potential future crises.

A further profile implied by the two criteria concerns the object of the valuation given that, as observed by Christensen and Nikolaev (2013), the application of fair value is useful when it can be estimated at a reasonable cost and provides significant information for management. Conversely, for illiquid non-financial assets, the historical cost may be the more appropriate criterion. With regard instead to securities, Carroll et al. (2003) take note of the difficulties associated with the determination of reliable fair values and at the same time underline the signaling value of this criterion and its ability to influence the stock price. In addition to assets, the differences between the two criteria also concern the measurement of income on which, in turn, dividend distributions depend. This profile is highlighted by Bessong and Charles (2012), who, precisely because of the double income-capital effect exercised by the evaluations of the financial statements, recommend that companies draw up their reports taking into account both the historical cost and the fair value.

As can be deduced from the discussion summarized above, the differences between historical cost and fair value are multiple and complex. However, while the literature has extensively analyzed the incompatibility profiles of the two criteria, few scholars have investigated the circumstances in which fair value and historical cost can lead to similar results. In light of the gap found, this study investigated the aforementioned circumstances regarding the Italian context, based on the observation that the application of the historical cost criterion implies not only references to past values but also connections to current market values.

3. FAIR VALUE HISTORY AND APPLICATIONS IN ITALY

The evolution of the rules on financial statements allows us to understand the development of fair value in Italy. In particular, the first codification of an autonomous regulation on financial statements is represented by the civil code of 1942, considering that the preceding regulation, and specifically the commercial code of 1882, contained a very limited number of provisions on annual reports. For this reason, the study takes into consideration the evolution of fair value in the context of the main reforms that took place in the eighty years 1942-2022.

The first reform to be mentioned for its disruptive impact on financial reports was introduced with Legislative Decree 127/1991, in the transposition of the fourth and seventh EEC Directives. This reform defined, for the first time in Italy, an organic regulation of the financial statements, with which the structures of the balance sheet and income statement – previously in free form – assumed mandatory content. At the same time, the rules for entering the values in the new schemes of financial statements and the evaluation criteria were dictated. The legislative framework outlined by Legislative Decree 127/1991 remained practically unchanged until the reform of company law, which, with Legislative Decree n. 6/2003, introduced a particular provision for the valuation of items in foreign currency, to be converted at the year-end exchange rate. In 2015, a further – and to date last – reform followed the transposition of EU directive 34/2013. In terms of financial statements, the reform introduced numerous innovations, concerning both the historical cost and the fair value. For the first time in Italy, fair value has become part of the evaluation criteria, in particular, to be applied to derivative financial instruments.

The study starts from the assumption, generally accepted in the literature, that the historical cost represents a criterion oriented towards the past and is, as such, unable to express the effective value of the company. In this regard, however, two fundamental factors must be considered:

a) any evaluation criterion – whether historical cost or fair value – must be adequate for the purpose assigned to the financial statements;

b) historical cost – as adopted in continental Europe, and more specifically in Italy – does not exclude fair value, but rather implies a particular application of it, functional to the above purpose.

These two factors are extremely relevant since, first of all, the appropriateness of the historical cost cannot be defined in the abstract, but must be judged concerning what the financial statements are supposed to represent. Secondly, since the historical cost is not incompatible with fair value, its application has significant management implications, requiring that past values are adjusted according to future forecasts.

Concerning factor a), in Italy, the main purpose of the financial statements is not to represent the current value of the company, but to show a conservative and rather underestimated value. This purpose can be explained by considering that the entire regulatory framework of the financial statements, outlined by the civil code, is built based on the protection of the company's creditors. This protection is achieved, above all, through the protection of the share capital which, in turn, requires moderate valuations that do not overvalue the company. For the reasons described, the company financial statements drawn up according to the provisions of the civil code are defined as "creditors oriented". On the contrary, in Anglo-Saxon countries, where fair value is mainly applied, the primary function that the financial statements must fulfill is to facilitate investors' decisions. It follows that, for this function, the fair value makes it possible to represent the current value of the company, also taking into account its prospective evolution. In this case, the financial statements are defined as "investor oriented". With respect to factor b), the analysis of the Italian civil code highlights how, in reality, the historical cost is accompanied, in a significant number of cases, by the application of the fair value, which, under certain conditions, must prevail over the historical cost. Therefore, it is not possible to conclude that the historical cost means neglecting the present.

4. METHODOLOGY

Since the study concerns a legal-related field, the method used was based on law analysis, understood in a general sense, as a tool for retracing the provisions of the Italian regulatory framework for the preparation of financial statements, with particular regard to the rules governing the evaluation criteria. This analysis was applied from a historical perspective and reconstructed the evolution of the rules starting from the first enactment of the civil code in 1942.

Considering that the objective of the research is verifying whether the historical cost criterion belonging to the Italian accounting tradition is so extraneous to fair value, the study started from the notion of fair value contained in the IFRS 13 standard, which defines it as "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date". In some cases, the market price of the asset or liability to be valued is available, while in others it must be estimated. In this second case, the valuation requires maximizing the observable input values and minimizing the unobservable inputs.

However, as established by IFRS 13 "the objective of a fair value measurement in both cases is the same — to estimate the price at which an *orderly transaction* to sell the asset or to transfer the liability would take place between *market participants* at the measurement date under current market conditions (i.e. an *exit price* at the measurement date from the perspective of a

market participant that holds the asset or owes the liability)". It follows that, in any case, fair value is a market-based measurement, and the valuation must be made following an exchange perspective aimed at determining a price. Based on this premise, the study formulated the following research question:

RQ1 What are marked-oriented evaluation criteria in the Italian Civil Code?

To answer the research question and identify the market-oriented evaluation criteria, this study considered not only those – actually only one – that the civil code designates as such, but all the situations in which the current value must be applied instead of the historical cost. To this end, the research was conducted assuming that using the fair value does not mean applying higher values than the historical cost, but rather applying the values that can be inferred from the market at the reporting date; and these values could also be lower than the historical cost: it depends on the market.

5. FINDINGS

As the main result, the research has brought to light that concerning the Italian rules for preparing financial statements, the concept of fair value is very similar to the cases in which the civil code, while using different terms, refers to values that cannot be traced back to historical cost. In particular, within the Italian legislation and the national accounting standards (OIC), at least 5 categories of current values can be identified. As summarized in Table 1, one category corresponds verbatim (in the civil code) to fair value and the other 4 are similar to it.

Table 1. Fair and similar values in the Italian context

Types of evaluation criteria	Current value categories
Specific criterion	Fair value
Similar criterion	Realization value inferable from market trends
Similar criterion	Presumed realizable value
Similar criterion	Current values at the end of the financial year
Similar criterion	Recoverable value

Source: Own elaboration

On closer inspection, the 4 categories similar to fair value, albeit defined with different terms, imply that the valuation takes the market into account and that the values thus determined are not extraneous to, but if anything very close to, fair value.

Based on these considerations, the study has identified the most relevant cases of application of market-oriented evaluation criteria by recognizing them in the situations in which the civil code establishes that historical values cannot be used, but values belonging to the classes identified above must be used.

The identification of the primary evaluation principles and their exceptions made it possible to outline a summary scheme that highlights the cases of non-application of the historical cost in favor of current values. The main market-oriented evaluation criteria found through the analysis of the legal framework (civil code) and technical framework (OIC accounting standards) are summarized in Table 2.

Table 2. Main marked-oriented evaluation criteria in the Italian civil code

Item	Evaluation criterion	Conditions for application
Intangible assets	Recoverable value	If durably less than cost
Tangible assets	Recoverable value	If durably less than cost
Financial fixed assets	Realization value inferable from market trends	If durably less than cost
Monetary assets in foreign currency	Current values (exchange rate) at the end of the financial year	In any case
Monetary liabilities in foreign currency	Current values (exchange rate) at the end of the financial year	In any case
Inventories	Realization value inferable from market trends	If less than cost
Receivables	Presumed realizable value	In any case
Current securities	Realization value inferable from market trends	If less than cost
Current financial assets	Realization value inferable from market trends	If less than cost
Derivative financial instruments	Fair value	Only if reliably determinable

Source: Own elaboration

6. DISCUSSION AND CONCLUSION

Two fundamental elements emerge from Table 2:

a) the cases of application of market-oriented evaluation criteria are far from marginal;
b) the adoption of market-oriented valuation criteria is subject to the circumstance that the value resulting from their application is lower than the historical cost.

First of all, Table 2 shows that the market-oriented valuation applies to all the main items of the balance sheet assets, thus testifying that this valuation can be as frequent as the historical cost. Secondly, the market-oriented criteria are not applicable at the choice of the drafter of the financial statements but must be adopted only in cases where the historical cost implies an overvaluation compared to current values at the end of the financial year. It follows that, in all cases in which the values determined using market-oriented criteria are higher than the historical cost, these criteria cannot be applied and the historical cost must prevail.

It can therefore be concluded that fair value is by no means extraneous to the Italian accounting tradition but its application is rigorously limited by the principle of prudence dictated to protect corporate creditors. This observation makes it possible to affirm that the Italian financial statements are not oriented only to the past but also take into due consideration the current values at the reporting date. Understood in this sense, the orientation of the financial statements in the past or the present depends, ultimately, on the trend in market values which, where decreasing for the most varied reasons, will determine a prevalence of current values over historical ones.

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Reporting of Social and Governance Measures in 2020 and 2021 by Real Estate Companies Stemming from German-Speaking Countries*

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Abstract: *In recent years, Environment, Social and Governance (ESG) related rules such as the Taxonomy Regulation of the European Union (EU) have had a lasting impact on the real estate industry and other market participants, and this trend is expected to continue. This study compares European regulation with common sustainability reporting practices in the Real Estate (RE) Sector in Germany, Austria and Switzerland (DACH region). The aim is to investigate what type of information related to employees and other social and governance issues is being provided and by how many of the largest RE firms are in the years 2020 and 2021. Our findings show that 20 out of 35 sustainability measures are more often reported in 2021 than in 2020. Although the trend is positive, there is still a lot of room for improving reporting quality. Small reporting frequencies are observable in the case of the following ESG measures: violations of the code of conduct (mentioned 1 time in 2020 and 2 times in 2021), safety inspections of buildings (mentioned 5 times in 2020 and 8 times in 2021), the total number of suppliers (mentioned 4 times in 2020 and 6 times in 2021), the share of expenses for local suppliers in % (mentioned 2 times in 2020 and 3 times in 2021), and obtained well-being certificates (reported by 5 firms in 2020 and 4 ones in 2021). Only 5 in 2021 (2 in 2020) firms planned to tie the board compensation to sustainability measures. These findings are important for individuals, companies, institutions and policymakers introducing new sustainability reporting rules in Europe as not only the real estate industry needs to prepare for the uniform EU taxonomy reporting requirements besides CSRD in the future.*

1. INTRODUCTION

The importance of sustainability and reporting on it has evolved rapidly over the past two decades. Nowadays people and businesses are aware of the need for fighting against climate change and for behaving ethically when interacting with communities, customers, suppliers and employees of companies. Even though the United Nations (UN) defined the term sustainability in 1987 for the first time, it took almost thirty years (until the 2015 Paris Agreement) to create the 2030 Agenda for Sustainable Development with 17 Sustainable Development Goals (SDGs) and 169 targets United Nations (1987) and United Nations General Assembly (2015). Sustainability is used as a term for describing many "green" concepts and corporate responsibility, while the abbreviation ESG (standing for Environment, Social and Governance) has become the preferred term for investors and capital markets. The reported ESG risks and performance measures show which risks a company faces and how it mitigates them to sustainably act and generate long-term financial returns. Unfortunately, various stakeholder groups have difficulties

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following the provided information, because of different coexisting ESG reporting standards and frameworks besides non-mandatory reporting regimes. For companies the high costs of data collection and additional reporting matter the most. However, effective ESG data management and sustainability reporting are essential for complying with the requirements of the existing Non-Financial Reporting Directive (NFRD) and the upcoming 2024 European Taxonomy combined with the Corporate Sustainability Reporting Directive (CSRD).

This study analyzes the status quo of mandatory and voluntary sustainability reporting, as the relevant laws in the European Union (EU) are only very rudimentarily formulated. The study aims to show what kind of information related to employees and other social and governance issues is provided by how many companies (this corresponds to "S" and "G" of the ESG dimensions). A key success would be to fix the traceability of ESG information provided in annual reports and other sustainability reports as this is essential/material for decision-making. The focus of this study is, therefore, on how comparable the ESG measures from large listed real estate companies from Germany, Austria and Switzerland are. The importance of ESG reporting by real estate companies can also be deduced from the commonly known fact that they are responsible for more than 30% of global CO2 emissions. The European Real Estate Association (EPRA) has issued recommendations on which measures to report and how to calculate them in advance, especially the environmental indicators (the latter are not covered in this article). Finally, the analysis aims to promote best practices developed by the largest companies in the sample for which sustainability reporting is mandatory.

In this study, the focus is on 55 companies with a market capitalization of more than 100 million EUR that submitted an annual report or/and a sustainability report in 2020 and 2021. Currently, there are no studies that explicitly address environmental, social and governance (ESG) reporting by real estate companies in the DACH region (Germany, Austria and Switzerland). Studies analyzing listed companies emphasize investor's demand for ESG information (e.g., Holder-Webb et al., 2009; Khan et al., 2013; Reverte, 2009) and provide crude measures of stakeholder sustainability orientation (e.g., Branco & Rodrigues, 2008; Campbell et al., 2006; Huang & Kung, 2010). The studies by Contrafatto (2014), and O'Dwyer and Unerman (2016), provide evidence of the drivers of mandatory corporate social responsibility (CSR) reporting by unlisted companies. Past research also shows that companies can subconsciously or consciously influence policy decisions through their ESG reporting (Morsing & Roepstorff, 2015; Shirodkar et al., 2018; Weyzig, 2009; Zhao, 2012) or/and consumer behavior (Asay et al., 2022; Carrigan & Attalla, 2001; Vogel, 2005). The results of the underlying study guide companies from different industries for their reporting on sustainability, especially concerning their social and governance issues based on best practices from the real estate industry in German-speaking countries. Additionally, it contributes to the literature by showing how patchy voluntary sustainability reporting still is in the real estate industry in 2020 and 2021. Implications for various stakeholder groups and more political action arise from these differentiated findings.

In the following, section 2 provides the regulatory background and section 3 describes the data and methodology. The discussion of the empirical results follows in section 4, while section 5 concludes the paper.

2. BACKGROUND ON SUSTAINABILITY REGULATION AND REPORTING REQUIREMENTS

The Sustainability Movement's Short History. As early as 1987, sustainable development was defined in the World Commission on Environment and Development's 1987 Brundtland report "Our Common Future" as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Hauff, 1987). It seeks to reconcile economic development with the protection of social and environmental balance. Next, in 1992, the UN Summit (United Nations, 1992) took place and the Sustainable Development Action Plan (Agenda 2021) was developed showing better measurement methods. At this time sustainability was still an abstract and unmeasurable concept, as there were no tools for quantifying sustainable actions (Caradonna, 2014; Thaler, 2021).

In 2005, the UN World Summit recommended the use of the model with the three "E", namely Environment, Economy and Equity/Social Justice, and the intersection S (Sustainability). This was the turning point as corporate social responsibility (CSR) and the triple bottom approaches were substituted. Subsequently, the UN issued the Millennium Development Goals (MDGs) before formulating the currently applicable Sustainable Development Goals (SDGs) for responsible investing in 2015 (the Paris Agreement). With the 2030 Agenda adopted in 2015 and enforced from 2016 on, the United Nations committed itself to 17 global SDGs and 169 sub-goals for a better future. The goal of the 2030 Agenda is to enable a dignified life worldwide, while at the same time permanently preserving the natural foundations of life. This includes economic, ecological and social aspects. The 2030 Agenda underlines the joint responsibility of politics, business, science and civil society including every individual for future living. In line with this argument, authors like Edmans (2019) stress that the primary goal of businesses is serving society, rather than focusing solely on profit maximization.

In the World Economic Forum's (WEF) Global Risk Report 2020 one can recognize the top five long-term risks: extreme weather, climate change mitigation failure, natural disasters, biodiversity loss, and environmental disasters (WEF, 2020). All of these developments reflect man-made environmental changes and are therefore indicative of the increased importance of harmonized sustainability reporting. Sustainability standards provide an opportunity for firms and institutions to address environmental and social problems while creating a sustainable economy. In sum, there are three broad categories of standards (Behnam & MacLean, 2011):

- Principle-based standards (e.g., UN Global Compact),
- Certification standards (e.g., external auditors are certifying compliance with the minimum requirements of the ISO 14001 environmental standard),
- Reporting standards (e.g., disclosure and transparency frameworks such as these provided by the Global Reporting Initiative (GRI)).

EU Sustainability Reporting Regulation. In 2001, the European Commission referred to activities carried out voluntarily in its first policy paper on CSR. Later it was recommending the EU improve the reporting and disclosure of corporate social and environmental activities in 2011 (European Commission, 2011). Subsequently, Directive 2014/95/EU, known as the CSR Directive or Non-Financial Reporting Directive (NFRD), required public interest entities to improve the comparability of non-financial disclosures starting in 2017 (EU member states were required to implement the directive by December 6, 2016). The NFRD applies to public interest entities with an average of more than 500 employees, total assets of more

than 20 million EUR, or net sales of more than 40 million EUR in a financial year. Public interest entities are credit institutions, insurance companies, companies listed and traded on a market of an EU Member State, or companies deemed to be of public interest (European Parliament and the Council of the European Union, 2014; Thaler, 2021). These companies are required to either include a non-financial statement in their management report or prepare a separate sustainability report for the public. Statutory auditors should only verify that the organizations delivered the non-financial report. In 2017 and 2019, the EC published guidelines for non-financial reporting and expanded them to include applicable sustainability standards such as the Carbon Disclosure Project (European Commission, 2017b, 2021). On April 21, 2020, the EU Commission adopted a proposal for a Corporate Sustainability Reporting Directive (CSRD) to apply from 2024 on. It aims to amend and supplement existing directives to include a wider range of companies (and audits) and to refine reporting requirements (European Commission, 2021). On November 3, 2021, the IFRS Foundation's Trustees established the International Sustainability Standard Board (ISSB) with a headquarter in Frankfurt, Germany. Its goal is to develop a global basis for sustainability-related disclosure standards. To create comparable information, an EU reporting standard for sustainability reporting is to be created. International frameworks such as Global Reporting Initiative (GRI), Sustainability Accounting Standard Board (SASB), International Accounting Standards Board (IASB), Task Force on Climate-Related Disclosures (TCFD), as well as UN Global Compact and the SDGs need to be considered. The EU sustainability reporting standards will be published in a delegated act of the EC (supplementary guidelines follow by Oct. 31, 2023).

Sustainability Reporting Requirements. Minimum reporting on environmental, social and employee issues, human rights, anti-corruption and anti-bribery, and diversity policy is required. In addition, the company's business model, business policy, risks and risk management concerning the aforementioned aspects need to be disclosed. Its due diligence policies, the results of these policies and non-financial performance indicators should be reported. The NFRD regulations lead to changes in the Third Book of the German Commercial Code, in particular in sections 289b to 289e and 315b to 315d HGB. The content required for the non-financial statement or sustainability report is set out in Section 289c HGB. In addition, it is recommended that organizations base their reporting on recognized national and international standards and indicate which standard has been used. The NFRD cites the Eco-Management and Audit Scheme (EMAS), the United Nations Global Compact (UNGC), the Guiding Principles on Business and Human Rights, the Organization for Economic Cooperation and Development (OECD) Guidelines for Multinational Enterprises, the International Organization for Standardization ISO 26000 Social Responsibility Framework, and the GRI. All in all, the NFRD includes the following basic principles:

- Essential, critical information;
- Presented in a fair, balanced, unbiased and understandable manner;
- Presented comprehensively but concisely;
- Providing insights into future strategy and processes;
- Taking into account all stakeholder requirements;
- Consistently and coherently prepared over time (European Commission, 2017a).

Similar rules apply to Austrian companies of relevant size. The NFRD was retroactively implemented into Austrian law in 2017. The Sustainability and Diversity Improvement Act (NaDiVeG) came into force on December 6, 2016, and the amendment to non-financial reporting is found in Sections 243b and 267a of the Austrian Business Code. Occasional changes occurred in the

Austrian Stock Corporation Act and the Limited Liability Companies Act (Bernhard & Riedlberger, 2021; Thaler, 2021). Lastly, on April 21, 2020, the EC adopted a proposal for the CSRD and these rules equally apply to Germany and Austria.

CSRD Regulation Relevant from 2024 on. The CSR Directive, published in the Official Journal of the European Union on December 14, 2022, amends the existing NFRD of 2014. Uniform European reporting standards and reporting rules following the principle of double materiality are specified. The CSRD also introduces an audit requirement for sustainability reporting and improves the accessibility of the information by requiring its publication in a digital and machine-readable format in the management report. The EU rules apply to all large companies (250 employees, net sales of 40 million EUR, total assets of 20 million EUR) and to all companies listed on regulated markets (listed micro-enterprises are exempted). A subsidiary will be exempted from the CSRD, if the parent company includes the subsidiary in its consolidated CSRD-compliant management report. Companies currently applying for the NFRD have to implement the CSRD starting in 2024, while others follow in later years.

Recent Swiss Regulation. There is still no legal obligation for reporting sustainability measures in Switzerland, even though the discussions in the Federal Council are currently dealing with this topic in detail. On Feb. 23, 2022, the Federal Department of Justice and Police (FDJP) commissioned the Federal Office of Justice (FOJ) to investigate the impact of the current EU regulations on sustainability reporting, transparency and due diligence obligations, and to survey any need for integrating into Swiss law. GRI is currently working with the European Financial Reporting Advisory Group and the International Sustainability Standards Board to align their respective sustainability reporting standards (Flach, 2022). ESG recommendations were already added to the Swiss Code of Best Practice for Corporate Governance in 2014. The Six Swiss Exchange even introduced the option for sustainable reporting (an opt-in option). Currently, four standards are accepted by the exchange: Global Reporting Initiative (GRI), United Global Compact (UNGC), Sustainable Accounting Standard Board (SASB), and European Real Estate Association (EPRA) (Kleibold & Veser, 2019).

In 2015, the Swiss Federal Council published a statement on CSR calling for (voluntary) transparency and non-financial reporting on corporate sustainability activities (Baumüller et al., 2018). The Federal Assembly provided an indirect counterproposal with the following two new regulations for the Code of Obligations in 2020 (Swiss Confederation, 2020). First, it introduces mandatory non-financial reporting for organizations defined similarly to the NFRD. Thus, companies affected are public interest entities with at least 500 employees in two consecutive financial years, total assets of more than 20 million CHF, or net sales of more than 40 million CHF. The report must be made available to the public for ten years and have similar content to the NFRD. Second, companies will be required to conduct due diligence and reporting on conflict zone minerals and child labor. This reporting and due diligence requirement apply to companies that import materials from conflict zones or high-risk areas as well as companies that offer products or services potentially linked to child labor. In sum, potential risks must be defined and countermeasures established (Swiss Confederation, 2020; Thaler, 2021).

It is expected that the new EU sustainability reporting obligation will also apply to non-EU companies that generate net sales of more than 150 million EUR in the EU and have at least one subsidiary or branch in the EU from 2028 on. Besides the currently estimated 50 000 companies affected by the new CSRD regulation in the EU, several large Swiss companies will also be

affected in the future by the latter. In the context of the updating process of the OECD Guidelines for Multinational Enterprises Switzerland is lobbying for adopting disclosure recommendations consistent with other international standards.

3. DATA AND METHODOLOGY

We analyze sustainability reporting practices of 55 publicly listed Real Estate (RE) companies from Germany, Austria and Switzerland region having a market capitalization above 100 million EUR in 2020 and 2021. Their annual reports or sustainability reports, if provided separately, are compared concerning the comparability of social and governance measures. Ideally, following EU law sustainability reporting is informative (materiality) and comparable. The three largest German companies are Vonovia (XTRA: VNA), Deutsche Wohnen SE (XTRA: DWNI) and LEG Immobilien AG (XTRA: LEG), while in Austria these are CA Immobilien Anlagen AG (WBAG: CAI), IMMOFINANZ AG (WBAG: IIA), S IMMO AG (WBAG: SPI). In Switzerland, the relevant counterparts are Swiss Prime Site AG (SWX: SPSN), PSP Swiss Property AG (SWX: PSPN) and Allreal Holding AG (SWX: ALLN).

The applied methodology is known as a content analysis based on investigating individual documents like non-financial text passages or statements (Wooldridge, 2013). As stated similarly in Austrian and German law, **minimum reporting is required on environmental, social and employee concerns, human rights, anti-corruption and bribery issues, and diversity policies** (e.g. § 289c of the German Commercial Code/HGB). This minimum reporting on the employee, and other social and governance issues are being further analyzed as it is not further specified. Most of the sample firms provide this information on a **voluntary basis** as their number of employees lies below 500. Hence, no mandatory disclosure is required unless a company is classified as a public interest entity, which is not the case here.

4. RESULTS

The annual or separate sustainability reports of the largest 55 real estate firms from the DACH region (Germany, Austria and Switzerland) provide a good overview of common sustainability reporting practices. **Table 1** shows how many companies provided employee, other social and governance-related information together with the type of information provided in the years 2020 and 2021. The direct comparison of the figures in these years allows observing the ESG measures reporting dynamics (i.e. the level of acceptance and implementation). We observe that more than 50% of the analyzed firms mentioned the total number of employees, supervisory board members, the share of women and the number of permanent full-time contracts in 2020. In 2021, this reporting frequency was only observable with regard to the total number of employees, supervisory board members, the proportion of female executives and % of women on the board of directors. Hence, while 49% of the companies surveyed still reported the total number of employees in 2020, the reporting rate fell by 14.3% in 2021. By contrast, the proportion of female executives rose by 33.3%, and the percentage of women on the board of directors by as much as 50%. In 2020, more than a third of the 55 firms commented on the proportion of female executives, % of women on the board of directors, staff turnover rate, newly hired employees, full-time employees and part-time employees. In 2021, the share of women, staff turnover rate, newly hired employees, total accidents, average age, full-time employees, and the number of part-time employees' number were mentioned by more than a third of companies.

Finally, in 2020 and 2021 less than a third of the Real Estate firms provided information on the salary ratio of woman to man, average sick days/year, the total number of trainees, executive pay ratio, and employee satisfaction except for total accidents and the average age that were seldom mentioned in 2020.[3] In Table 1, it can be observed that several ESG measures are being mentioned more often in 2021 than in 2020. For example, some numbers increased by approx. 20% newly hired employees, approx. 35% average age, approx. 50% of women on the board of directors, executive pay ratio and employee satisfaction, ca. 80% total accidents. In contrast, less often are mentioned in 2021: the total number of employees in Austria and Switzerland (in Germany this information is mandatory), the share of women, employees with a permanent contract, total number of trainees and full-time employees, which is surprising as the latter information does not seem to be too difficult to be obtained from internal data.

Individuals, institutions and companies interested in **sustainability reporting best practices** can focus on the sustainability reports of the largest RE firms and EPRA recommendations. For example, Vonovia's report consists of more than 100 pages and contains many visualizing pictures, boxes, graphs and relatively easy-to-understand text passages. Readers with a higher level of business knowledge may rather be interested in the tables placed at the end of the report, which show the quantitative ESG measures over time. The sustainability performance indicators can also be looked up in an Excel file separately provided by the firm on its webpage. It contains more than 15 sheets and can be used for orientation when developing its own ESG reporting system. Almost all of the largest RE companies in the sample provide very solid sustainability reports that can be recommended for further hands-on guidance.

Table 1. Overview of the Changing Number of Firms Reporting Employee, Other Social and Governance Information in 2020 and 2021 – Part I (55 Sample Firms)

Information type	Number of reporting firms in 2020/2021
Number of employees	49/42 (-14,3%)
Share of women	28/26 (-7,1%)
Employees with a permanent contract	28/16 (-42,9%)
Proportion of female executives	21/28 (+33,3%)
% of women on the board of directors	18/27 (+50,0%)
Salary ratio of woman to man	12/13 (+8,3%)
Staff turnover rate	20/21 (+5,0%)
New hired employees	20/24 (+20,0%)
Average sick days per year	11/11 (+/-0%)
Total number of trainees	14/11 (-21,4%)
Executive pay ratio	7/10 (+42,9%)
Total Accidents	10/18 (+80,0%)
Average age	14/18 (+28,6%)
Full-time employees	23/22 (-4,3%)
Part-time employees	19/17 (-10,5%)
Employee-Satisfaction	8/12 (+33,3%)

Source: Own research

In Table 2, further information regarding the employee, and other social and governance measures is provided. In sum, most of the companies (37 in 2020 and 39 in 2021 out of 55) list their supervisory board members, which is mandatory for many firms. In 2020 and 2021, more than a

[3] The proportion of female workers (mentioned by 21 firms in 2020 and 28 ones in 2021) lies between ca. 27% and 74% (not reported). The percentage of women in executive positions is rather low, which is partially the reason why the gender pay ratio is seldom provided.

third of the 55 companies confirm to have anti-corruption processes implemented and reported 2 in 2021 (0 in 2020) proven cases of corruption and 1 in 2021 (0 in 2020) incident of discrimination. However, firms are not willing to comment on these issues. Moreover, in both years 25 companies directly related their activities to the SDGs and 20 out of 55 firms obtained sustainability certificates in 2021 versus only 14 out of 55 having one in 2020.

Small reporting frequencies are observable in the case of the following ESG measures: violations of the code of conduct (mentioned 1 time in 2020 and 2 times in 2021), safety inspections of buildings (mentioned 5 times in 2020 and 8 times in 2021), the total number of suppliers (mentioned 4 times in 2020 and 6 times in 2021), the share of expenses for local suppliers in % (mentioned 2 times in 2020 and 3 times in 2021). Obtained well-being certificates, which confirm that firms are offering good working conditions for their workforce, were only reported by 5 firms in 2020 and 4 in 2021. Only 5 (2) firms in 2021 (2020) planned to tie the board compensation to sustainability measures. These surprises are because tying the board's and management's compensation to common sustainability measures (with low chances to be manipulated) could be the most effective tool in speeding up sustainability efforts. In this context, it is interesting to recognize that the number of companies that developed their sustainability performance index increased from 4 in 2020 to 9 in 2021 (+125%). This, together with the fact that 20 firms in 2021, instead of 14 in 2020, obtained a sustainability certificate shows a positive trend toward sustainable changes.

Less than a third of companies confirm to follow the human rights guidelines (14 in 2020 and 12 in 2021 out of 55). In addition, 11 in 2020 and 7 in 2021 companies mentioned offering ESG-specific employee training, while another 7 in 2020 and 15 in 2021 firms mentioned employees examining a Code of Conduct training. In 2020 and 2021, 10 and 14 firms respectively, undertook customer surveys to further improve service/product quality and on the supplier side 13 firms reported in both years to have business partner Code of Conduct/Supplier Code of Conduct rules established. Finally, 8 in 2020 and 13 in 2021 companies engaged in regional sponsoring projects. On the one side, the involvement of firms, customers, suppliers and employees in following human rights guidelines, ESG and Code of Conduct rules could be extended to more firms. On the other side, it is important to admit that several measures were mentioned more often, even though the original 2020 frequency level was low. The number of employees with a code of conduct training more than doubled, regional sponsoring projects increased by ca. 60%, mentioning the total number of suppliers, safety inspections of buildings, customer surveys, developing own performance indices, tied board compensation to sustainability measures and obtaining sustainability certificates increased by ca. 50% (Table 2).

Even though the comparability of the employee, and other social and governance measures increased over time, one has to admit that there is still a lot of room for improvement. Companies should invest more time and resources to increase sustainability reporting quality to make the latter comparable. This type of basic sustainability reporting should become mandatory for a wide range of firms, not only the largest ones. Over time sustainability indicators will be generated directly in the finance department and supervised by the Chief Financial Officer (CFO). Finally, the sustainability trend can be perceived as an opportunity for increasing innovativeness and publishing confirming ESG scorecards. From all 55 analyzed real estate companies only a few are planning to tie compensation to sustainability measures or self-developed indices in the coming years, which would be motivating management the most to rise sustainability reporting quality to the next level. The new EU regulation which comes into effect in 2024 can lead to major improvements in sustainability reporting quality in the future.

Table 2. Overview of the Changing Number of Firms Reporting Employee, Other Social and Governance Information in 2020 and 2021 – Part II (55 Sample Firms)

Information type	Number of reporting firms in 2020/2021
Proportion of employees with Code of Conduct training	7/15 (+114,3%)
Violations of the Code of Conduct	1/2 (+100,0%)
Regional sponsoring projects	8/13 (+62,5%)
Supervisory Board members	37/39 (+5,4%)
Proven Case of corruption	21(0)/19(2) (-9,5%)
Incidents of discrimination	16(0)/17(1) (+6,3%)
Safety inspection of buildings	5/8 (+60,0%)
Total No. Of Suppliers	4/6 (+50,0%)
Share of expenses for local suppliers (in %)	2/3 (+50,0%)
ESG specific training (Yes/No)	11/7 (-36,4%)
Customer Survey (Yes/No)	10/14 (+40,0%)
Well-being certificate (Yes/No)	5/4 (-20,0%)
Business partner Code of Conduct/ Supplier Code of Conduct	13/13 (+/-0%)
Own Sustainability Performance Index (Yes/No)	4/9 (+125,0%)
Board Compensation tied to Sustainability measures (Yes/No)	2/5 (+150,0%)
Anti-Corruption processes implemented (Yes/No)	22/21(-4,5%)
Human-rights issues commented/followed (Yes/No)	14/12 (-14,3%)
Sustainability Certificates (Yes/No)	14/20 (+42,9%)
UN SDG's Included in the Report	25/25 (+/-0%)

Source: Own research

5. CONCLUSION

This study aimed to show common sustainability reporting practices of real estate companies in 2020 and 2021, given prevailing European regulations. To date, it remains unclear, whether firms on purpose establish sustainable processes or whether they argue existing structures into being sustainable. In the last years, sustainability became a buzzword and sustainability reporting is often perceived as a marketing tool. However, transformative work needs to be done as investors and consumers are aware of the necessity to go green.

Generally, it is not easy to compare the reported sustainability measures focused on employees and other social and governance issues across firms stemming from one industry in one country (e.g. Real Estate in Germany or Austria). In all three countries, most data can be found on employees and governance issues, while other social issues are seldom commented on. We find evidence that several ESG measures are being mentioned more often in 2021 than in 2020. For example, some numbers increased by ca. 20% newly hired employees, ca. 35% average age, ca. 50% the % of women on the board of directors, executive pay ratio and employee satisfaction, and by ca. 80% total accidents. More than 50% of the analyzed firms only mentioned the total number of employees, supervisory board members, the share of women and the number of permanent full-time contracts in 2020. In 2021, only the total number of employees, supervisory board members, the proportion of female executives and % of women on the board of directors are mentioned this often. Although a positive trend in the reporting of sustainability measures can be recognized, the general reader usability of sustainability reporting seems to be rather low in 2020 and 2021. Our findings are indicative as only two years of data and a relatively small sample of 55 firms stemming from one industry were analyzed. Future research could focus on smaller firms in this industry and undertake a content analysis across various industries for several years including all possible ESG measures.

Sustainability standards/measures arguably play an essential role as they allow corporations to evaluate and disclose their sustainability-related activities. The number of sustainability standards is constantly increasing, while one global comprehensive system for companies is still missing – this remains problematic. Establishing the ISSB and extending the sustainability reporting requirements at the EU level from 2024 on may be improving reporting quality.

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A Novel Approach in Corporate Social Responsibility Performance Measurement

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Abstract: *Corporate Social Responsibility Performance (CSR) Measurement is as essential as performing CSR. Measurement of Corporate Social Performance is two-fold: firstly, can assist stakeholders in understanding the difference between short-term financial metrics and building valuable long-term relationships and assets leading to long-term corporate value. Secondly, it offers society, employees, and customers the ability to judge a corporation's social behaviour and ethics and reward it accordingly. So, the exact contribution of CSR to a company and its stakeholders should be evaluated and assessed by tangible and measurable results. Since there is no standardised method or predefined criteria for CSR assessment, literature has tried to define the influencing factors of corporate social performance and to describe the techniques and methodologies of CSR assessment. However, due to its "soft nature", the pure social part of the term is difficult to measure. Corporations use Global Reporting Initiative (GRI) Standards and Key Performance Indicators (KPIs) to measure their performance. However, these measures are not sufficient since they cannot affect corporate strategic goals. In the present paper, a CSR performance measurement framework is presented, targeting to assist organisations in measuring the effectiveness of their CSR initiatives. The key factors affecting corporate performance are identified, and a literature review of the concept is performed.*

1. INTRODUCTION

Several factors can influence Corporate Social Responsibility (CSR). Profitability and business continuity, leadership beliefs, corporate reputation, environmental awareness, compliance with laws, social equity issues, and innovation are some of them. The measurement of corporate Social Performance is two-fold: foremost will assist stakeholders in perceiving the difference between short-term financial metrics and build valuable long-term relationships and assets, resulting in long-term corporate value. Secondly, it allows society, employees, and customers to evaluate a corporation's social behaviour and ethics and reward it accordingly. So, the precise contribution of CSR to an organisation and its stakeholders should be evaluated and assessed by tangible and measurable results. Since there is no standardised technique or predefined criteria for CSR assessment, literature has tried to outline the influencing factors of corporate social performance and describe the techniques and methodologies of CSR assessment. However, the purely social part of the term, because of its "soft nature," is tough to be measured.

Many corporations use Global Reporting Initiative (GRI) Standards to measure their impact on the economy, environment, and society. Key Performance Indicators (KPIs) constitute a unique approach to CSR performance measurement. They are another method used to attain an overview of the organisation's CSR performance via predefined values appointed to parameters and play a

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key role in CSR initiatives evaluation. However, these measurement means are not considered efficient since they cannot quantitate performance in fields such as reputation and customers loyalty.

Under this framework, CSR perception incorporated into strategic management as a means of enhancing both the social profile and the company's competitiveness will be investigated in this paper. More specifically, we aim to investigate the prominent position of CSR on the corporate agenda and the benefits it creates for all parts of the chain. We will also analyse the critical success factors that play a crucial role in adopting and implementing CSR initiatives. The key factors affecting corporate performance are identified, and some of the most well-known CSR performance measurement frameworks are presented, targeting to assist organisations in evaluating the effectiveness of their CSR initiatives. Based on the guidelines of ISO26000:2010 (ISO, 2010), the proposed framework aims to identify both practices and existing constraints related to CSR performance evaluation.

2. CONCEPT OF CORPORATE SOCIAL RESPONSIBILITY

Corporate Social Responsibility is one of the most popular and emerging organisational issues for the academic community and the business world. Implementing CSR initiatives triggers organisations to undertake responsibility related to their activities' impact on customers, employees, shareholders, the community, and the environment. For this reason, CSR has been considered one of the most critical objectives for companies (Luo & Bhattacharya, 2006).

The concept of CSR embraces three organisational aspects: economic, environmental, and social and is extended beyond legislation, as organisations voluntarily incorporate these aspects in their strategies, aiming to play a more responsible role in the world. The socially responsible activities of a company represent its awareness of the environment in which it operates (Trong Tuan, 2012). These activities significantly impact society, the environment, employees, and, at the end of the day, the company itself.

Many definitions of the term exist in trying to depict CSR understanding and implementation requirements. Elkington (1997) identified a more common expression of these three organisational aspects as people–planet–profit (planet for ecological vision and profit for economic management). The balance among the three is a vital issue for CSR success. Based on this theory, Hourneaux et al. (2018) proposed a minimum set of indicators to be measured by companies to represent the triple bottom line (TBL) approach, associating these indicators with their different degrees of use in companies so this is often considered the primary attempt related to CSR performance measurement.

Freeman's stakeholder theory (Freeman, 1984) extended Elkington's theory into another influential model. The famous Stakeholder Model acknowledges that an enterprise has stakeholders. However, additionally, it considers the corporation itself as an additional stakeholder in a community of corporations that strives towards common goals. This community usually experiences synergies and economies of scale and exerts strain to succeed in achieving these shared goals. Another scholar suggests that companies should be considered as the source of the social and environmental problems they are trying to solve (Granum et al., 2015) and not as part of the solution. Therefore, the debate about their role and their obligations is loud. Friedman (1970) argued that the only social responsibility of a business is to increase its profits within a legal and ethical framework and that a firm cannot be held responsible; only people can. Similarly to Friedman, French

(1979) states that companies can have responsibility and ethics, not as autonomous entities but via their people since they are organisations with specific structures that apply decision-making procedures. The result of this decision-making depicts their people's mindset and ethics.

On the opposite side, Zadek (2004) considers that companies have extended responsibility against society. Therefore, he categorizes them into three distinct generations regarding their social activities for sustainable development: philanthropy, corporate strategy to be used as a competitive advantage, and finally, companies that implement activities that can make a difference. Following Zadek's view, Matten et al. (2003) describe how companies implement those activities.

Porter and Kramer (2006) linked their value chain model to CSR. He states that many companies have already undertaken efforts to improve their activities' social and environmental consequences. He concluded that the efforts at that time could have been more productive. He identified two main reasons for this lack of productivity. The first was based on the finding that business and society were independent - distinct parts without considering their strong interdependencies. He also noticed that companies approached CSR from a strategic point of view that accommodated their interests and benefits rather than the wider community's general interests. Porter argues that to successfully implement CSR, the focus must be shifted towards a broader framework by understanding the interconnections between society and corporate environments while at the same time including it in corporate strategic goals. He also believes that the key issue guiding CSR is the opportunity to create shared value. He considers this as a societal benefit but also a corporate benefit as well.

When CSR moved from theory to practice, it was considered an essential actor in terms of corporate strategy. Literature contributed to this direction by defining the CSR phenomenon (De Bakker et al., 2005; Garriga & Mele, 2004). To this end, Garriga and Mele (2004) map the present territory by classifying the main CSR theories and related approaches into four groups. These are instrumental theories, in which the corporation is seen as only an instrument for wealth creation, and its social activities are only a means to achieve economic results; political theories deal with the power of corporations in society and the responsible use of this power in the political arena; integrative theories, in which corporation are focused on the satisfaction of social demands; and finally ethical theories, based on ethical responsibilities of corporations to society. Each CSR theory presents four dimensions related to profits, political performance, social demands, and ethical values. The findings suggest the necessity to develop a new theory on the business and society relationship, which should integrate these four dimensions.

Zadek (2004) states that organisations pass through five stages of corporate responsibility, from defensive, to compliance, to managerial and strategic, and, finally, to civil. According to Goyal and Kumar (2017), the top management's involvement and commitment are highly crucial for the successful implementation of CSR. However, the top management's value system and thought process affect the successful formulation and implementation of CSR activities (Chin et al., 2013).

In this respect, CSR has become an integral part of the strategic business planning of most organisations, with its influence spanning from internal policies to external initiatives involving diverse stakeholders. Different CSR levels have been considered in strategic management processes to increase employees' motivation, stakeholders' profit, and the impact on society (Marques-Mendes & Santos, 2016) in their path to creating a corporate brand name and generating competitive advantages.

3. CSR INTEGRATION IN STRATEGIC PLANNING

Corporate social responsibility can become a source of tremendous social progress as the business applies its considerable resources, expertise, and insights to activities that benefit society (Porter & Kramer, 2006). Many strategic management research studies signify the positive interconnection between social success and economic and financial profitability (strategic CSR approach). Porter and Kramer (2006) stressed the importance of integrating corporate strategy and society's needs, while Lantos (2001) introduced the concept of strategic responsibility, linked to fulfilling philanthropic responsibilities that will simultaneously benefit financial performance.

In 2011, the Commission launched its renewed CSR strategy, which combined horizontal approaches with more specific ones, referring to individual sectors and policy areas for the promotion of CSR (European Commission, 2011). Considering that a public authority has to support and ensure CSR conduct by using an intelligent mix of voluntary and mandatory measures, including regulation, put CSR at the centre of Commission policies and proposals. The actions that Commission is targeting are analytically described in a staff working document (European Commission, 2019) published in March 2019. Extra emphasis is given to the drivers of corporate social performance, the actions that managers can take to affect that performance, and the consequences of those actions on both corporate social and financial performance (Epstein & Roy, 2001) as well as the stakeholders. Stakeholder theory (Freeman, 1984) identifies strategic motivations for relationships with the different categories of stakeholders. The differential roles that transformational and transactional leadership styles play in corporate social responsibility practices and the interplay between leadership styles and institutional CSR practices are also under continuous consideration (Du et al., 2013).

Strategic CSR in the framework of its underlying motivations and core factors, the evolutionary stages and circumstances that trigger movement and illustrate characteristic company attitudes and practices at each stage, have been revealed such as institutional, environmental, and organisational factors that could shape and constrain the development of corporate citizenship in the contemporary corporate environment (Mirvis & Googins, 2006). Nijhof and Jeurissen (2010) state that the term corporate social responsibility is all about the responsibilities of corporations to society, although nowadays it is much more about new market opportunities and a business-wise approach to ecological and social problems. Regarding the level of CSR inclusion in strategic planning, Maon et al. (2010) refer to CSR dedication and implementation stages.

These stages are subdivided into different dimensions describing a consolidative model while different characteristics from academic literature are formulated into cultures in which an organisation can exist. In addition, Kourula and Halme (2008) focus on the societal and business outcomes of engagement and classify different corporate responsibility (CR) actions into three types – philanthropy, integration, and innovation which influence corporate engagement and commitment. Chandler (2018) stated that corporations are strategically engaging in CSR initiatives aiming to achieve specific objectives and create value for shareholders. According to their strategic goals, he considers that managers face CSR initiatives from different perspectives, not by irresponsibility, but with a view to the potential benefits, it will offer. Therefore, CSR initiatives are included in organisations' strategic planning and are broadly recognised through policies and activities involving stakeholders and society. However, the term has evolved, gaining recognition among top management processes, and Corporations acknowledge their obligations

towards society, extending beyond law mandatory aspects and the narrow goal of profit-making. Thus, how companies apply CRS is necessary to gain increased social acceptance. Thus, corporations face the challenge of efficient implementation of related initiatives.

4. CRITICAL SUCCESS FACTORS (CSFS) AFFECTING CSR PERFORMANCE

The most significant Corporate Social Responsibility CSFs can be classified as external and internal, based on the source of the factors causing them. According to Aguinis and Glavas (2012), they are divided into three distinct categories: individual, organisational, and institutional, with the organisational ones to be most acknowledged. Other scholars divide them into value-driven, performance-driven, and stakeholder-driven (Govindan et al., 2015; Maignan & Ralston, 2002). These studies consider value-driven, the ones that spring from self-motivation. In contrast, performance-driven ones depend directly on corporate economic performance, and stakeholder-driven ones reflect stakeholders' demands regarding CSR initiatives. Besides literature, corporations have also identified criteria regarding the factors that can impact CSR. From this perspective, the challenge is balancing corporate performance and responsibilities with the social obligations an organisation needs to exercise beyond mere compliance.

4.1. Human Resource Management (HRM) contribution to CSR Performance

HRM is considered one of the enablers of CSR in an organisation (Jamali et al., 2015). Voegtlin and Greenwood (2016) noted that the debate in CSR–HRM is dominated by two trends: HRM as a part of CSR and CSR as a part of HRM. The critical issue of these trends is two-fold: to explore the role of HRM in the development and implementation of CSR as well as the impact that HRM functions have on CSR initiatives and secondly, how CSR as an element of HRM, influences the implementation of effective and 'socially responsible HRM (Barrena-Martínez et al., 2019).

Companies have embraced Corporate Social Responsibility practices, which are encouraged and supported by HRM (Human Resources Management) professionals, HR management practices, and employees. CSR, by definition, involves people, both society and employees and their interrelation. Strandberg (2009) asserts that "HR is a strategic partner in the organisation and, as such, can help drive the formulation of the CSR strategy", while Fernández et al. (2003) state that organisational culture and HRM decisions are essential elements for the creation of a sustainable competitive advantage of organisations because they are "the linking mechanism for the rest of the company's resources".

Due to its strategic influence, HRM can contribute to the development and implementation of CSR. It can contribute to shaping the organisational context for the exercise of responsible leadership. The development of CSR strategy in organisations concerns establishing CSR objectives, priorities, frameworks, policies, and initiatives (Carroll & Buchholtz, 2008), which are shaped by various organisational factors that influence management decisions, such as the company's size, reputation, history, and leadership. The leaders' mentality, beliefs, abilities, and actions have a major impact on CSR implementation. However, CSR can be also driven by employees' will, with the support of HR. HR is directly involved in a company's strategic planning and has the crucial role of aligning CSR strategy with corporate objectives and values. HR is responsible for promoting positive behaviour, creating an engaged workforce, and sustaining a work environment where CSR is embedded in every aspect of the employee's lifecycle (Weybrecht, 2010).

The implementation of CSR strategy is linked to organisational culture and employee involvement (Cooke & He, 2010). It can bring cultural changes (Maon et al., 2009) that are evidenced by adopting different work practices. Through various roles and tools, HRM can play a crucial role in managing the relationship between leaders and employees by enhancing the centrality of employees in CSR strategies and co-design processes where employees actively contribute to shaping CSR practices. This is crucial to developing CSR policies that reflect and fulfil employees' needs (Rupp et al., 2006). In addition, employees can play an essential role in generating social capital that emerges from responsible management (Muthuri et al., 2009), and they have the power to push leaders to implement CSR activities (Aguilera et al., 2007).

Leadership and employee relationship to HRM have a bi-directional influence on each other. To evaluate the practical contribution of HR to responsible leadership, employees' commitment to CSR activities and consequently to the implementation of CSR initiatives, Gond et al. (2011) clustered HRM practices into three categories:

- Advanced HRM practices are reported as CSR. Practices traditionally regarded as part of HR, such as training, labour health, safety, etc. For some companies, CSR strategy enables them to deploy advanced policies related to those mentioned above. These practices are usually managed by HR and are often externally reported as 'CSR initiatives'.
- Practices that overlap CSR issues and HRM. These CSR practices are focused on employees and rely on HR support. They are frequently regarded as a part of CSR strategy and are related to issues such as policies targeting gender issues or ethics and compliance.
- CSR practices involving HR. These practices usually focus on external stakeholders as well as on employees. They aim to improve the local society and environment as well as to assist those in need.

4.2. Managerial Perception Influencing CSR

Lately, there is a growing admittance by corporations that not only should they seek financial gain and compliance with legal requirements but also that they should be seen as a significant actor of accountability implementation in the corporate environment. Two dimensions motivate corporations that embrace CSR, the strategic and the moral (Graafland & van de Ven, 2006), with both of them being highly dependent on leaders' values and beliefs (Hemingway & Maclagan, 2004). The strategic dimension is based on CSR pursuits while achieving profitability. It targets the provision of direct and indirect benefits to the organisation while contributing to the wellness of society (Porter et al., 2012). So, CSR initiatives incorporated in corporate strategy are an emerging topic in the business world due to four trends that greatly influence the consumers' and society's perception (Belal, 2016). Customers' demands, the ubiquitous flow of information via social media conjointly with the direct communication among active groups and organisations, and the necessity for urgent actions regarding ecological resources and the environment force companies to act responsibly and conscientiously (Crowther & Lauesen, 2017). On the other hand, the moral motive springing from the moral duty of corporations reflects their obligations towards society.

CSR initiatives depend on management's perception of the subject. Managers with a narrow conception of the term (Quazi & O'Brien, 2000) focus on maximizing shareholder value while complying with legislation and are usually skeptical regarding CSR practices. According to this conception, CSR is a utopia based on pure philanthropy and should only occur when it contributes to profitability. Thus, these managers tend to be less committed to CSR initiatives. However, other

managers with a wider perception of CSR, entailing aspects such as ethical and moral responsibilities, consider corporations an integral part of society. Therefore, they play a critical role in embodying effective CSR into corporate strategy, and while reflecting on the benefits of it, they support ethical management and sustainable development. Although, managerial discretion is the key point and includes actions, initiatives, and decisions based on business ethics and decision-makers' morality. It can determine the processes of corporate social responsiveness and reinforce the outcomes of corporate behaviour related to public expectations of social responsibility (Wood, 1991). Nevertheless, an organisation's economic performance should be addressed since economic sustainability affects the degree to which corporations act socially responsibly.

4.3. Knowledge Management and CSR Performance

Management is defined as planning, organising, leading, and controlling resources to accomplish specific performance objectives (Schermerhorn, 2005). Knowledge Management (KM) is considered the most critical asset of an organization (Girard & Girard, 2015). It is described as the process of creating, sharing, using, and managing the knowledge and information of an organisation. It is considered an interdisciplinary approach for capitalising knowledge in achieving organisational goals and aligning with challenges posed by globalisation. Davenport and Prusak (1998) define knowledge management as the method that simplifies the processes responsible for sharing, distributing, creating, capturing, and understanding information, ideas, and perceptions that constitute a company's knowledge. Although Knowledge Management is a challenging and important topic for an organisation, the required experience for instrumenting CSR initiatives has yet to be. Leadership support and corporate culture are the essential prerequisites for promoting knowledge related to CSR in an organisation. Several CSR objectives can be linked with innovative initiatives originated by KM and embraced by corporations. This collision generates valuable intangible assets such as corporate reputation, image making, and loyalty, promoting at the same time the relationship with stakeholders and influencing performance.

Within KM, some taxonomies explain some types of knowledge. The most known distinction is between tacit knowledge and explicit knowledge (Nonaka & Peltokorpi, 2006). Tacit knowledge originates from personal experiences, which designate self-thinking, generating knowledge that is difficult to articulate. However, knowledge is initially tacit, developed over time, through a trial and error process and according to experience gained. Explicit knowledge refers to verbal and written communication, organised data, applications, and other explicit forms of information, transmittable in formal, systematic language. The combination of tacit and explicit knowledge creates organisational knowledge, which focuses on the process of knowledge distribution created in an organisation. KM aims to develop methods and systems that will improve the knowledge assets in the context of an organisation, which in turn, will enhance the overall corporate performance. Regarding CSR, KM contributes to the development of practices that satisfy stakeholders' objectives (Waddock, 2004, 2008).

Knowledge Management processes usually focus on organisational aspects such as continuous improvement, increased performance, and competitive advantage of the organisation. Innovation in corporations depends on management's perceptions and internal and external decision processes. Even though CSR and Sustainability aspects have been given considerable attention, more necessary knowledge is needed to implement such initiatives. For this reason, KM in the context of CSR is considered an essential and very challenging prerequisite, able to provide opportunities for organisations, assisting CSR integration into corporate strategy.

Innovation, KM, and CSR depend on the extent to which stakeholders adopt the cultural values underlying these processes. KM is responsible for connecting the social dimension of CSR with innovation and development, stemming from Knowledge exchange, and generating specific initiatives that will benefit customers, stakeholders (internal and external), society, and the environment. Innovation can be the key to facilitating recurring developments in pertinent activities (Dai et al., 2013). This relationship between innovation, CSR, and corporate performance can also reverse. The most profitable an organisation is, the more means it has to be innovative and create new knowledge (Helfat, 1997), enhance corporate culture (Denison, 1990) and reputation (Roberts & Dowling, 2002) and develop human capital (Wright et al., 2005). Therefore, the prevalence of a culture that encourages trust, participation, and support explains the achievements of KM in the field of CSR. For this, managers and stakeholders need to consider how to integrate CSR into innovation in a way that will benefit the overall corporate performance.

4.4. Change Management and CSR

The role of Corporate Social Responsibility continues to gain attention and has the potential to affect (and be affected) significantly change management within an organisation. Stakeholders demand the active engagement of corporations in social and environmental initiatives, so managers have a twofold role; to change the way they conduct their business (Mahmood & Humphrey, 2013) and to ensure acceptance across all organisational levels while integrating CSR. To succeed in this, a Change Management (CM) process is essential since it will contribute to meeting the intense and highly competitive expectations of a rapidly changing corporate environment that affects organisations. Change does not mean disruption but adjusting to new by making appropriate interventions that will offer a comparative advantage.

In CSR terms, this may imply a need to adopt more appropriate social change strategies (Sachs, 2015) to effectively meet the advent of socioeconomic challenges. Under this view, two CM conceptualisations could be implemented. The first one refers to the interaction between the organisation and its external stakeholders while the second is oriented to the internal processes required for change (Zollo et al., 2009) and both of them are critical for the integration and adoption of CSR within an organisation (Rodríguez Bolívar et al., 2015). Organisations are willing to include social objectives into their strategy and integrate respect into their corporate culture to contribute to social progress. Therefore, as CSR implementation is becoming more imperative, there is a growing need for managing the change of CSR integration. (Boubakary & Moskolaï, 2016).

4.5. Continuous Improvement

According to scholars, Continuous Improvement is perceived as a planned, organised, and systematic approach aiming to improve overall organisational performance (Gonzalez Aleu & Van Aken, 2016; Granerud & Rocha, 2011). The process of continuous Improvement (CI) was initially focused on product quality and efficiency of production systems. Since Corporate Social Responsibility was not a primary concern for organisations, the improvement of the field was not included in corporate agendas and was considered unnecessary. The acknowledgment of CI as a crucial factor for social responsibility and sustainability became a fact with the realisation of the responsibility of corporations towards their stakeholders and society. Employees' active involvement at all hierarchical levels was a necessity. Organisations were forced to develop the essential capabilities, the appropriate mentality, and the required knowledge and skills (Mohrman

& Worley, 2010) that will allow them to use integrated management approaches to create added value for their different stakeholders and to achieve excellence and viability. Comprehensive methodologies such as six sigma and total quality management utilise a dedicated group targeting to improve a process or system aiming to achieve a general or specific objective, usually over a relatively short period and with minimal capital investment.

5. CSR PERFORMANCE FRAMEWORKS

5.1. Global Reporting Initiative (GRI)

The concept of pure profitability as the only measure of corporate development has gradually altered during business development. Therefore, in contemporary corporate environments, extra emphasis is given to CSR initiatives implementation in parallel with pursuing profits. Under this framework, CSR engagement requires corporations to be focused while working on meeting their CSR targets. The general information about the level of success of this engagement is delivered to stakeholders and investors through CSR reporting. Therefore, its quality is of high importance since it serves the purpose of establishing proper communication.

Global Reporting Initiative (GRI) is a quality-driven initiative dealing with CSR matters related to CSR performance. It was founded in 1997 by corporations and organisations of the Coalition for Environmentally Responsible Economies (CERES), aiming to develop appropriate guidelines for reporting on economic, environmental, and social performance, initially for corporations and eventually for any organisation, governmental or non-governmental (GRI, 2002). Representatives from different companies participate in the GRI organisation. To ensure that the proposed guidelines serve their purpose, a stakeholder council continuously evaluates the content of the reports. Additionally, companies exercising these guidelines are encouraged to communicate them to their stakeholders and coordinate their efforts to propose new guidelines.

The GRI organisation is considered the global standard setter of sustainability impact reporting from vision and corporate strategy to organisational systems influencing sustainability. GRI promotes a common language for sustainability impact reporting and acknowledges that only some indicators can be applied to all businesses. GRI reporting guidelines (GRI, 2002) contain a variety of environmental, social, and economic performance indicators, and they are considered essential assets for sustainability reporting.

They are designed to enable corporations to understand and provide a report about their most significant impacts on the triple bottom line – people, planet (environment), and profit (economy); including how they are managed. Their purpose concerning corporate reporting is to enhance the credibility and transparency of sustainable development contributions. This facilitates comparability and checks the quality of reported information, supporting managers and leaders in making well-informed decisions and assessments. GRI Standards guide the implementation of responsible business conduct, and they are based on expectations. International authorities such as the Organization for Economic Co-operation and Development (OECD) and the United Nations (UN), in their guidelines, report information using these Standards, assisting thus in the assessment of an organisation regarding CSR performance.

5.2. Key Performance Indicators for CSR Performance Measurement

Implementing social responsibility actions often assists upper management in leading a corporation to fruitful results. KPIs are another method of measuring CSR performance success and reverberations. Well-defined and structured KPIs are necessary for motivating employees to perform better. Corporations have started to follow a charitable attitude towards society, with some managers resisting and arguing that this concept distracts the corporation from its primary purpose of existence, profitability.

Another area for improvement is regarding the proper recording and measurement of KPIs. Firstly, this requires extreme thoroughness in deciding which initiatives should be followed and which will be discarded. Then, defining appropriate values is vital in quantifying the KPIs suitably and impartially. This is quite challenging since the social branch of CSR is difficult, if not unfeasible, to be measured.

Besides the measurable KPIs, CSR performance is continually evaluated by employees, customers, and business partners. As far as employees are concerned, their percentage of corporate satisfaction can be measured e.g. with internal surveys as well as their engagement. The number of hours volunteered by an employee, and the employee turnover rate are KPIs that can be quantified. Regarding customers, the complaints received and the retention rate can be measured. Of course, customers' involvement and the feedback received are also issues for companies to consider. In this respect, interactions with corporate social media combined with the number of active users (on a daily or a monthly basis) can be analysed, offering invaluable information.

6. PROPOSED CSR PERFORMANCE ASSESSMENT FRAMEWORK

While corporations try to accurately measure their CSR performance using either KPIs or GRI performance indicators, we propose a holistic methodological framework on the combination of the CSR enablers and critical success factors, aiming to incorporate CSR into corporate strategy, measure the performance and evaluate the results.

The Glykas Quality Compass (GQC) framework provides a matrix, a ten-to-ten table, founded on the ten most crucial critical-success factors identified in current maturity-assessment frameworks and the ten best-known enablers, which are identified in the literature. The matrix can be used concerning the CSFs during the framework's design and regarding the enablers during the implementation of the CSR holistic framework for the three-fold managerial perspective Processes – Human Resources – Information Technology.

The proposed framework is based on GQC and ISO26000:2010 standard requirements. This standard guides those who recognise that respect for society and the environment is a critical success factor. It is a way of assessing an organisation's commitment to sustainability and its overall performance. All the guidelines of ISO26000:2010 apply to any organisation, regardless of its type or size, or the products and services it provides.

The holistic approach of the GQC maturity assessment model, combined with Critical Success Factors (CSFs) corporate social responsibility management principles and organisational resources, could be implemented for Corporate Social Responsibility Performance Evaluation, providing a helpful guide for the continuous improvement of organisations. At the same time, it depicts the level of maturity regarding CSR implementation in corporate environments.

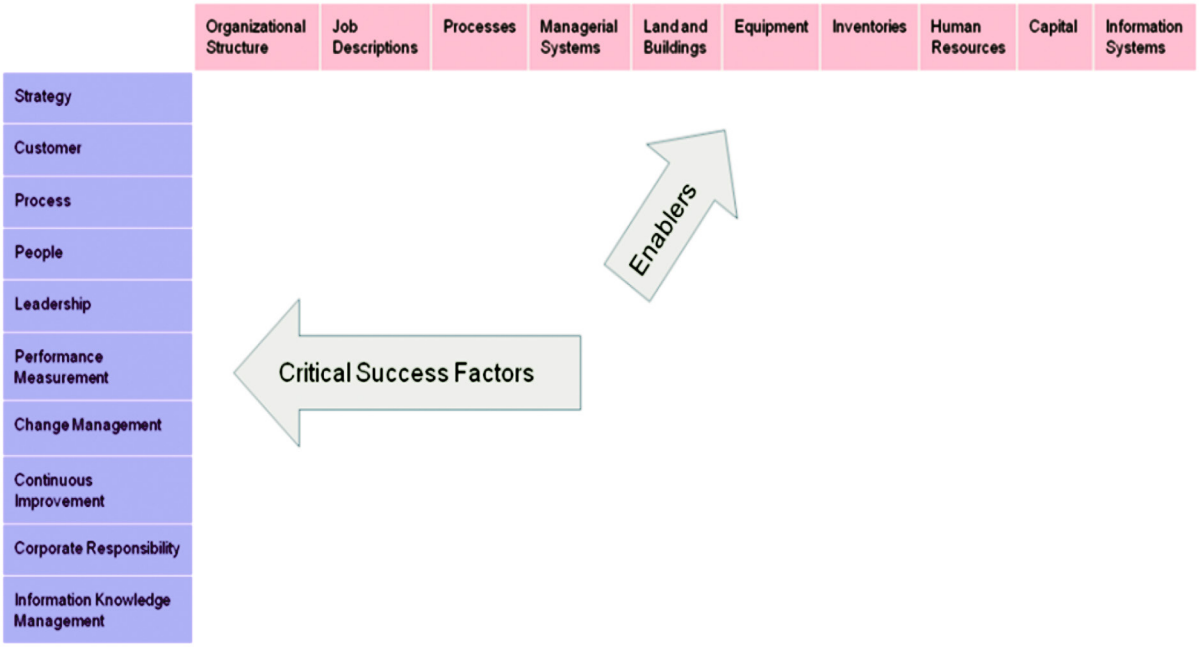

Figure 1. The framework of Glykas Quality Compass (2019)
Source: Glykas, 2019.

Based on the description of the typical levels of CSR maturity, the proposed framework provides a roadmap for those targeting to achieve a better maturity level while measuring their performance in the related field. Each level has prerequisites that need to be fulfilled for CSR maturity to proceed to a higher one. Under this perspective, the proposed CSR maturity framework acts as a tool/method that assesses organisations regarding their CSR performance and suggests actions for CSR performance improvement.

The GQC framework places weight on qualitative performance CSFs, such as those related to processes, continuous improvement, change management and leadership, since they are perceived to be necessary. They are integrating these concepts into strategy. This model targets measuring the objectives achieved and the activities and CSR policies performed.

Figure 2. Maturity Levels of the proposed framework
Source: Glykas, 2019.

The proposed framework evaluates the level of maturity of CSR implementation in corporate environments and measures its performance (Glykas, 2019). However, the evaluation process is complicated since it is mainly based on qualitative indicators, which cannot accurately be translated into quantitative results. The most critical difficulty in this evaluation relates not only to the results of the indicators used but also to the fact that the measurement is usually based on different indicators mature and less mature organisations use. Nevertheless, the feedback provided by this assessment process will allow the readjustment of the CSR strategy in general.

7. CONCLUSION AND FURTHER RESEARCH

The most important finding of the proposed holistic framework is that Corporate Social Responsibility should be integrated into corporate strategic goals to be efficient. The proposed approach identified the critical success factors and their interdependencies in terms of management and leadership, human resource, internal processes, and customers that can influence the CSR adoption in a corporation's strategy. Considering the same factors as a method of performance measurement is a good starting point for identifying the necessary adjustments that can lead to a higher maturity level. The proposed indicators can affect the corporate processes at all levels, demanding the involvement of upper management and the employees.

Of course, many questions have arisen, related to the CSR performance evaluation, and have to be further researched. The most important one is the accuracy of the quantification of the proposed indicators. These indicators are soft, therefore, can only be measured with quantitative criteria. Furthermore, their impact on corporate results can only be calculated afterward. A second question that needs to be analysed is the CSR maturity levels and their impact on corporate strategy. CSR maturity is meaningful only when a corporation considers CSR actions as a competitive advantage able to offer added value in corporate results, either financial or in terms of reputation/customer relations.

Under this frame, the research will be carried out in the future, examining the weaknesses of the proposed approach. In practice, the applicability of the suggested model should be examined in the field with an end-to-end approach starting from corporate strategy goals formulation until the actual implementation of the initiatives.

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The Digital Nomad Motivation in the Republic of Croatia

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Abstract: *Advances in computer and information technologies, widespread access to the Internet and more frequent use of mobile devices allowed for the development of new lifestyles and options for organization of work. Among the most prominent trends of this kind that seems to be gaining popularity is digital nomadism. Digital nomads abandoned the traditional work structures and choose to work remotely at locations that best suit their needs. This paper adds to existing research by investigating the motivation behind the decision to become a digital nomad in a less advanced economy. In order to achieve this aim, empirical research was carried out during the fall of 2022. The collected data was analyzed with Cronbach's Alpha coefficient to test the reliability of the items and explorative factor analysis to extract different motivation factors. The results unveil that Croatian workers may be motivated to become digital nomads and what might motivate them to do so.*

1. INTRODUCTION

In recent decades, new technologies, the widespread access to the Internet and information, as well as the more frequent use of mobile devices, affect the emergence of new lifestyles, trends in human behavior and the way companies build their organizational structures, business models, products and services as well as organize their work tasks. To keep up with those trends and a highly competitive market, companies exhibit an increase in demand for highly educated workers whose abilities and knowledge become the most important resources of an organization. Companies that want to retain the best experts should be ready to apply new organizational solutions for particular jobs and workers that are being enabled by the aforementioned new technological advances. One of the more prominent trends that is gaining popularity in recent years, allowing workers to develop a lifestyle wherein they work remotely and travel on the one hand, and organizations retain the best workers on the other, is called digital nomadism. The term 'digital nomad' most often refers to a job-oriented professional who rejects the imposed structures of the traditional way of working in the office and instead opts for autonomy, flexibility and the ability to travel and work from the place that suits them best at a given moment (Cook, 2020, p. 355). In modern conditions, some jobs become independent of time and location, which allows the workers to accept and live the idea of merging remote work and travel as a lifestyle. Although when the trend of digital nomadism was still not widespread and most digital nomads were not employers of a particular company but worked as external associates, recently an increasing number of workers (their number may be in the hundreds of thousands, Schlagwein, 2018) decide to work as the company employee who is not related to a location. Therefore, a digital nomad could be defined as an individual who is not dependent on time and place, and whose lifestyle is allowed through the availability of three main resources: intelligent mobile devices, high-speed internet access and access to information necessary to carry out his work (Bartosik-Purgat, 2018). Digital nomads seek to abandon the traditional rigid work practices, as well as the binary balance of home/workplace, and working hours/holidays, that they leave to find freedom and self-realization (Mancinelli, 2020).

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2. LITERATURE REVIEW

The first authors to write about the phenomenon of digital nomadism were Makimoto and Manners (1997) who predicted that people would be able to choose to be mobile, i.e. 'nomads', owing to the advancements in digital technology, thus coining the term digital nomad. Since the study of this phenomenon as a modern form of work has great importance for the academic and professional community (Frick & Marx, 2021), different researchers attempted to describe different aspects of the behavior and characteristics of digital nomads. Some researchers on digital nomads focused their attention on describing the digital nomad's lifestyle (Haking, 2017), and attempting to integrate digital nomads into a workplace (Leitner, 2016), but the most considerable body of work dealt with finding and describing basic characteristics of digital nomads. Digital nomads define themselves as non-tourists, highly mobile and work-oriented (Cook, 2020). They seek to combine motives for tourism, leisure and business activities to build a unique lifestyle based on remote work, travel around the world and frequently change places of residence (Mancinelli, 2020). Furthermore, digital nomads differ from traditional workers since they need to apply harder than traditional workers to find a balance between their work and personal life. They also differentiate from other remote workers, since they choose to stay in destinations for shorter periods and do not have a permanent place of residence. Digital nomads are more entrepreneurial than typical workers and also more accustomed to job insecurity (de Almeida et al., 2021). Furthermore, digital nomads are mostly highly-qualified workers from developed Western countries who choose to align their lifestyles with digital work (Schlagwein & Jarrahi, 2020), who work in software development, graphic design, and informational technology (Getman, 2021), but also as journalists, military personnel, travel guides, seasonal workers, enterprise managers, etc. (Mancinelli, 2020). It was also found that digital nomads predominately choose locations in Thailand or Indonesia for their temporary residences (Carter, 2016; Schlagwein, 2018). In addition, Statista (2022) found that digital nomads are mostly in their thirties (47% of them). According to Getman (2021), as much as 40% of workers from the IT sector worked remotely, but this trend in digital work is on the rise (Schlagwein, 2018). This rise in digital nomadism may be seen from the fact that many jobs from the financial, management, professional services and information sectors might be performed remotely (Lund et al., 2020). The aforementioned also points to the conclusion that the number of digital nomad workers may have the potential to increase in the future.

Another important area of research on digital nomads is the impact they have on their environment. When describing their influence on the economic environment, de Almeida et al. (2021) concluded that digital nomads challenge the traditional economy since they deal with novel technologies, have untraceable finances and consume services produced within the 'grey-market'. Aside from the aforementioned influence on the economy, it was found by different authors that digital nomadism has a deeper and positive impact on other aspects of the world economy. For example, digital nomads are becoming a phenomenon that encourages an entire industry to adapt to this group of workers, primarily specific tourist services (Frick & Marx, 2021; Hannonen, 2020; Thompson, 2019; Wiranatha et al., 2020), but also specific IT and communication solutions. In order to entice digital nomads to accept a specific tourist service or destination, this aspect of behavior of digital nomads was also researched. Considering the influence of digital nomads on the economic and tourist sectors, different authors tried to define and describe possible motives that encouraged individuals to choose this way of working and living so as to be able to predict their behavior. Thus Muller (2016) found that digital nomads strive to satisfy their need for freedom by traveling while working. Cook (2020) argues that the main motivational factor

for digital nomads is most often considered the desire to escape from the disciplinary structure of the modern workplace, which primarily includes eight-hour working hours, micro managerial strategies of superiors and daily trips to the workplace. Mancinelli (2020) argues that digital nomads are motivated to travel to find a more meaningful life, allowing them to free themselves from a fixed workplace and carry work with them while exploring different cultures and places. Schlagwein (2018) finds that digital nomads have different value systems that can explain the motives that encourage them to opt for this lifestyle. Namely, digital nomads have developed their value system in which they abandon the values of wealth accumulation, stability and comfort and replace them with the values of minimalism, uncertainty and risk (Mancinelli, 2020). In line with the above, Frick and Marx (2021) conclude that while this lifestyle allows for more freedom, it also implies more job insecurity. However, in addition to the desire for freedom and insecurity that characterize the motives of digital nomads, some authors conclude that some of them also base their lifestyle decisions on economic reasons (Schlagwein, 2018) or that some of the motives are both tourist and business nature. Among these studies stands out that of Prabawa and Pertiwi (2020) who explore the motives of digital nomads coming to Bali. The results of this research suggest that digital nomads in Bali are attracted by tourist motives, such as an inspiring destination or pleasant and fun activities, but also factors concerning prerequisites for work, such as locations that provide support for work and stay, job-related motives and expansion of the business network.

Despite the aforementioned research, the literature studying the phenomenon of digital nomads was described as missing by some relevant authors (Kong et al., 2019; Muller, 2016). One of the gaps in digital nomad research is the acceptance of trends among workers in less developed countries, such as Croatia. To better understand this phenomenon and the propensity to adopt it, it is necessary to understand the motives for choosing this lifestyle and work conditions. Therefore, this paper will try to explore whether there are motives for becoming a digital nomad among Croatian workers, as well as what those motives might be.

3. EMPIRICAL RESEARCH

The measuring instrument used in this research was a questionnaire consisting of two parts. The first part of the questionnaire was compiled of questions and claims developed from the questionnaires and findings from the relevant literature that dealt with the study of the phenomenon of digital nomads (Haking, 2017; Prabawa & Pertiwi, 2020; Smercina, 2019). The second part of the questionnaire consisted of general questions that provided data on the demographic characteristics of respondents, such as their age, average monthly household income they have, education, workplace, etc. The questionnaire was administered to respondents online during the fall of 2022. 104 respondents employed in workplaces that enable remote work in the Republic of Croatia filled out the survey and the collected data was analyzed. 72% of the respondents were female, residing in different parts of the country, they mostly had reached a higher education level and mostly lived in families with more than 3 members.

The research showed that 61% of all respondents found digital nomadism attractive or partly attractive, and 49% of them would pursue this lifestyle. However, when asked whether they see themselves as digital nomads within 1 month or 6 months, 67% and 63% of them answered no, respectively. Furthermore, when answers related to work conditions, business atmosphere, and working hours were analyzed; it could be noted that in almost all questions, more than 50% of respondents answered positively, which means they saw positive aspects of this way of working.

65% of respondents found tourist trips as a motive for becoming digital nomad. Analyzing the differences in responses concerning gender, no difference was observed, while younger respondents generally had more positive attitudes toward digital nomads than older ones.

Furthermore, exploratory factor analysis was performed using the principal components method to differentiate the motives of digital nomadism based on the questionnaire. The reliability of the questionnaire was examined by the Cronbach Alpha coefficient and the questionnaire was found reliable (0,924) which meant that it had internal consistency. The Kaiser-Meyer-Olkin test of the adequacy of sampling (0,823) showed that the sample was adequate. The appropriateness of the sample was tested using Bartlett's test of sphericity (1167,37; p=0,000). For easier interpretation, the Varimax rotation was chosen. Four factors were extracted and the amount of 72,33% of the total variance was explained. The extracted factors were: Socio-political reasons, Changes in standard working conditions, Desire to change life, and Desire to travel. The first factor 'Socio-political reasons' was strongly related with seven variables which referred to more favorable economic conditions, better political conditions, greater trust in social institutions, loss of faith in traditional roles, and dissatisfaction with current life. The second-factor 'Change in standard working conditions' referred to finding new business opportunities, earning money without the burden of office life, more favorable working hours and freedom and new experiences, and included four questions from the questionnaire. The third factor 'Desire to change life' included five questions, and it mainly referred to the attractiveness of the digital nomad lifestyle, the desire to experiment in the life of a digital nomad, the possibility of meeting other people who have similar interests, more opportunities to find accommodation with an acceptable price, more positive atmosphere for remote work. The fourth factor 'Desire to travel' consisted of two claims from the questionnaire and referred to a great desire to travel and considering travel a lifestyle. The results of the factor analysis are shown in Table 1.

Table 1. Factors loadings for variables in factor analysis

Factors	I	II	III	IV
Digital nomadism would allow me to find a place to live that is related to my work/project.	0,606			
I am thinking about digital nomadism because I want to find more favorable economic conditions than those in the Republic of Croatia.	0,584			
I would opt for digital nomadism in order to find a destination with better political conditions than those in the Republic of Croatia.	0,718			
I am thinking about digital nomadism because I have lost trust in social institutions in the Republic of Croatia.	0,821			
Digital nomadism attracts me because I want to find better conditions for family life - better education, better health and social protection, etc.	0,693			
Digital nomadism attracts me because I have lost faith in traditional roles and the course of life that are socially acceptable.	0,787			
I intend to try digital nomadism because I feel dissatisfied with my current life.	0,724			
Digital nomadism would allow me to find new business opportunities.		0,695		
Digital nomadism would allow me to earn money without the burden of office life.		0,869		
Digital nomadism would allow me more favorable working hours.		0,756		
Digital nomadism gives me freedom and new experiences.		0,514		
I find the life of digital nomads attractive.			0,706	
I would like to try to be a digital nomad.			0,550	
I like digital nomadism the most because it gives me the opportunity to meet other people who have similar interests as me.			0,754	
Digital nomadism would give me more opportunities to find affordable accommodation.			0,616	
Digital nomadism would provide me with a positive atmosphere for working remotely.			0,704	
Digital nomadism attracts me because I have a great desire to travel.				0,832
Digital nomadism appeals to me because I consider travel a lifestyle.				0,819

Source: authors' calculation

4. FUTURE RESEARCH DIRECTIONS

There are many future research directions this paper could not have followed due to the limitations of the research. Digital nomadism has not been researched enough in the context of developing countries, so future research should deal with this problem further, i.e., the motives for digital nomads should be investigated in other less developed and underdeveloped countries. The additional direction could be the investigation of factors that might affect the decision for becoming a digital nomad. Also, technological prerequisites or attitudes about this lifestyle in the community in less developed countries could be analyzed.

5. CONCLUSION

One of the more prominent trends that is gaining popularity in recent years, allowing workers to develop a lifestyle wherein they work remotely and travel on the one hand, and organizations retain the best workers on the other, is called digital nomadism. Recently, this way of working has become more and more popular. There is research conducted on this topic, but in Croatia, there is a lack of such research. To fill this gap in the understanding of this trend, research into the motives of Croatian workers employed in jobs that allow remote work was conducted. The research was conducted via survey. The collected data was analyzed with an exploratory factor analysis that resulted in the extraction of four factors. These factors were: Socio-political reasons, Changes in standard working conditions, Desire to change life, and Desire to travel. Based on the conducted analysis, a conclusion can be made about the motives for choosing digital nomadism as a way of working, but also of leisure and free time. Social and political reasons could be singled out as the first motive. People see digital nomadism as an opportunity to find more favorable economic or political conditions or to find a destination with better political conditions than those in the Republic of Croatia, or better education, better health and social protection, etc. The second group of motives can include all motives associated with the desire to change standard working conditions. People are motivated by the opening of new opportunities, by working without a traditional office, and the absence of traditional working hours from 9 to 17, which gives them freedom in organizing all their work and free time. The third group of motives comprised those related to a desire to alter their life and it mainly referred to the attractiveness of the digital nomad lifestyle, the desire to experiment with the life of a digital nomad, the possibility of meeting other people who have similar interests, more opportunities to find accommodation with an acceptable price, more positive atmosphere for remote work. The fourth group of motives is related to people's desire to travel and they see this way of working as an opportunity to visit destinations and places they wouldn't visit otherwise. The conducted research provided a better understanding of the opinion and motives that might encourage Croatian workers to choose to be digital nomads. But there are other directions future research should investigate, such as attitudes about digital nomads and motives for choosing this lifestyle in other less developed countries.

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Impact Assessment of COVID-19 on the Tourism Industry in North Macedonia

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Abstract: *As a result of closed borders, limited mobility, and social distancing, tourism is one of the first and most severely affected economic sectors during pandemics. Considering the characteristics of Covid-19 in terms of speed of spread and the consequences it has on human health, it was the most serious crisis that the tourism industry has faced so far. To prevent the spread of the virus, many countries implemented border lockdowns which disrupted life and caused a severe economic downturn. The restrictive measures caused a significant decline in economic activity and brought tourism to an abrupt halt. This paper estimates the impact of Covid-19 on tourism and contributes to a better understanding of the effects of COVID-19 on tourism in North Macedonia and the required response in different sectors at various scales.*

1. INTRODUCTION

Tourism, as one of the most important sectors of the global economy, is a significant contributor to the world's GDP and an important driver of every nation's economic growth (Naradda Gamage et al., 2017). It is of vital economic, social and cultural importance, and offers real prospects for sustainable and inclusive development. Not surprisingly, the tourism sector is one of the fastest-growing economic sectors in the world. Although in the short-term this growth can be often disrupted mainly due to economic uncertainty and health crisis, over the long-term tourism is expected to continue to grow. Governments are well aware of the significance of developed tourism on the economic growth of the countries, therefore they are creating and implementing policies and strategies so that local communities can fully benefit from the dynamic tourism economy.

Tourism plays a significant role as well in the Macedonian economy. This sector has been on the rise in the past ten years with a more than double increase in the number of tourists in 2019 compared to 2010. Domestic tourists increased by 31.7% in the last decade, while international tourists increased by an incredible 189,5% from 2010 to 2019 (SSO). These data indicate the new approach towards tourism activities, which has the goal to maximize the contribution of tourism to the economic development of the country.

Unfortunately, this upward trend was interrupted by the Covid-19 global pandemic in the early months of 2020. Due to the health and economic crisis caused by the virus, the tourism sector was affected on a large scale. All countries, including North Macedonia, suffered tremendous losses. To determine the exact impact that Covid-19 had on the North Macedonia tourism industry, this paper analyses the latest available data for the country and makes comparative

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analyses among different sectors in the industry, as well as with the impacts on the other countries in the region.

Investigations on the impact of COVID-19 on the tourism industry in North Macedonia are extremely rare in the existing literature. Limited literature was available on the global impact of COVID-19 on economic growth as well. Fortunately, there are many reports by UNWTO, WTTC, and UNCTAD which have identified the impact of COVID-19 on the tourism sector. Thus, the main contribution of this study to the existing literature is adding new, significant relationships between the COVID-19 pandemic and the tourism sector.

2. LITERATURE REVIEW

Considering the recent appearance of COVID-19, there is not enough literature that analyzes the effects of the pandemic caused by this virus on the economy in general, and on the tourism industry, in particular. However, numerous studies demonstrate that a pandemic can cause severe consequences on society, implicitly in the field of tourism (Gössling, 2002; Hall, 2006; Page & Yeoman, 2007; Scott & Gössling, 2015). Studies of government agencies (National Academies of Sciences, Engineering and Medicine, 2017, 2018) and institutions (Jonas, 2014; World Bank, 2012) also confirm these conclusions. Looking at the published data from the first six months since the pandemic spread globally, it is needless to say that the COVID-19 outbreak had greater influence than other recent pandemics. International tourist arrivals are forecasted to decline in 2020 by up to 30%, with a loss of worldwide tourism revenue of US$ 450 billion (UNWTO, 2020) which is ten times more than the global financial impact of the SARS epidemic (Shretta, 2020).

In fact, according to the authors Gössling et al. (2020), it shows that: "tourism as a system has been resilient to external shocks". Still, the COVID-19 crisis will have unprecedented impacts (OECD, 2020). According to Burkle (2006): "The connections between pandemics and travel are fundamental to understanding health security and global change." In this regard, authors like Gössling (2002), Hall (2006), Fauci and Morens (2012), Rossello et al. (2017), Qiu et al. (2018), Bloom and Cadarette (2019) and many others, have warned about the possibility of a pandemic crisis affecting society and tourism on a large scale. The SARS epidemic, which started in a Chinese province, is another representative example of an epidemic with a negatively profound impact on tourism around the world. This negative impact is coming from the fact that nowadays, there are a lot of people traveling worldwide, which makes it easy for a local epidemic to be transferred abroad.

To assess the exact economic impact of this pandemic on tourism and the measures needed to revive the global economy, several studies and reports of various international organizations (UNWTO, WTTC, OECD, and the European Commission) were conducted. UNCTAD (2020) analyzes 65 individual countries and regions and 65 sectors, covering the global economy where it tries to estimate the direct and indirect costs of the shutdown of the tourism sector. The research confirms that in some countries, unemployment could rise by more than 20 percentage points, while some sectors could nearly be wiped out if the duration of the tourism standstill is up to one year. In addition to the supportive measures by governments, UNWTO and other relevant organizations, a sustainable approach to tourism is needed, to learn from the crisis and anticipate trends (Mihai & Toma, 2020).

3. METHODOLOGY AND DATA ANALYSIS

The study analyzes the impact of the COVID-19 outbreak on the tourism industry in North Macedonia using a secondary data set from the National State Statistical Office and reports from the World Travel and Tourism Council (WTTC). Descriptive analysis using the available secondary data was implemented in the analysis of the tourism industry and other supporting sectors to the tourism industry. The applied data set covers the period from January 2019 to October 2022, which is the last available data at the moment of research. The international tourist receipts were the authors' calculation using secondary data from the State Statistical Office and WTTC. Following that, the structure of international tourist spending was used to estimate the impact on sectors. The difference in the number of international tourists in each region, between 2019 and 2020, was used to estimate the loss in revenue in each respective region.

The study first analyses the exposure to tourism as % of the GDP of North Macedonia and its neighboring countries. It looks at the decline of international tourists in North Macedonia and the loss of international tourists' receipts. Based on this information, the loss in revenue as a result of the decline in tourism activity by region and by sector was calculated. It should be noted that this study analyzes only the decline in international tourists and their impact on overall tourism.

3.1. TOTAL CONTRIBUTION OF TRAVEL & TOURISM TO GDP

Tourism in North Macedonia participated with 6.6% of the total GDP in 2019, 4.8% in 2020 and 5.6% in 2021. This sector employed 54,800 people or 6.9% of total employment in 2019, 48,100 people, or 6.1% of total employment in 2020, and 51,300 people, or 6.4% of total employment in 2021. Compared to the region, only Serbia is in a less favorable position with a 5.9% total contribution of travel and tourism to GDP in 2019, to 3.7% in 2020 and even 3.6% in 2021. Even though Bulgaria was in a better position having 9.9% total contribution of travel and tourism to the total economy in 2019, as a result of the pandemic this percentage has significantly decreased to 4.2% in 2020 and 4.9% in 2021. Next is Bosnia and Herzegovina with 9.7% of travel and tourism to GDP in 2019, 5.0% in 2020 and 6.6% in 2021. Greece had a 20.7% of the total contribution of travel and tourism to GDP in 2019, decreasing to 9.2% in 2020 to 14.9% in 2021. Albania was in a similar position to Greece in 2019 having 20.3% travel and tourism as part of the GDP, decreasing to 10.5% in 2020 and then rising again to 17.4% in 2021. Montenegro suffered the most in 2020 in terms of tourism losses, however, they managed to recover quickly the next year. In 2019 travel and tourism contributed 30.8% of the total economy. This number decreased to 7.7% in 2020 but increased to 25.5% of the GDP in 2021 (Figure 1) (WTTC, 2022).

Furthermore, the exposure to international tourists in North Macedonia is more balanced, with 50% of revenue generated from tourism coming from international tourists, and the other 50% from domestic tourists in 2019. The situation in 2021 has not changed much, 51% of the revenue was generated from international tourists, while the remaining 49% was from domestic tourists. In Bosnia and Herzegovina, the situation before the pandemic in 2019 was 36% of revenue generated from domestic tourists and 64% from international tourists. The situation in Bosnia and Herzegovina after the pandemic in 2021 was 44% of the revenue generated from domestic tourists and 56% from international tourists. In Serbia in 2019 the revenue from domestic tourists was 31% and from international tourists 69%, changing to 34% in 2021 from domestic and 66% from international. Greece generated 32% revenue from domestic tourists and 68% from international tourists in 2019, and 37% from domestic tourists and 63% from international tourists

in 2021. Albania's revenue from travel in tourism was generated 23% from domestic and 77% from international tourists, while in 2021 it was 20% from domestic and 80% from international tourists. In Bulgaria, 12% of domestic and 88% of international tourist spending was generated in the total revenue, changing to 20% of domestic and 80% of international in 2021. Lastly, Montenegro generated 11% of domestic and 89% of international tourists in terms of the total revenue from travel and tourism in 2019. The situation in Montenegro returned to the same position in 2021 having 12% from domestic and 88% from international spending as part of the total contribution to the revenue from travel and tourism (WTTC, 2022).

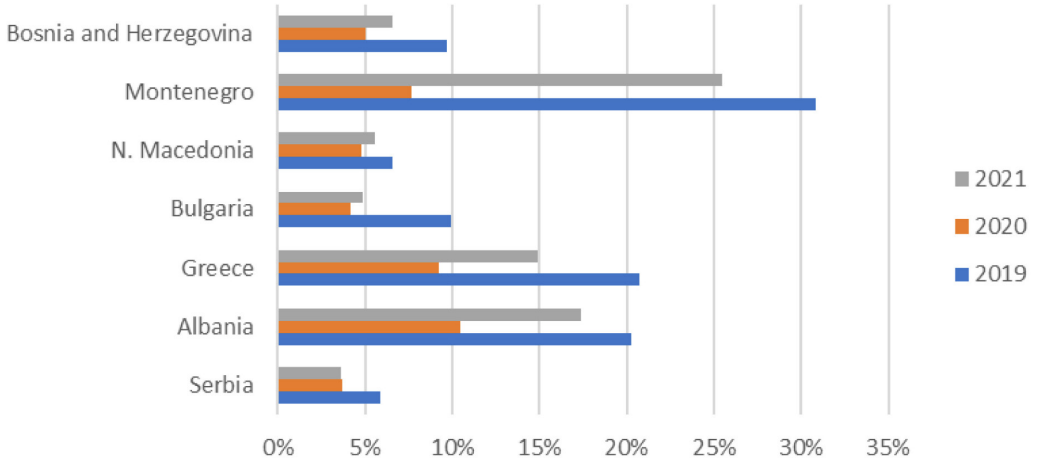

Figure 1. Travel and tourism as a % of GDP
Source: World Travel & Tourism Council, 2022

3.2. COVID-19 AND THE TOURISM INDUSTRY IN NORTH MACEDONIA

Covid-19 has changed the way people live. One of the changes is the restriction of free movement, and because of that tourism has suffered losses. North Macedonia was not immune to this trend. In March 2020, compared to the beginning of the year, there was a decrease of 68% in international tourists in North Macedonia. In April, when the state closed its borders, there was a drop of as much as 99.5%. If we take into account the trends for the previous 4 years, the impact of Covid-19 is obvious. As the borders opened up, from June till the end of 2020, there is a noticeable rise in the number of international tourists, albeit it is still far lower than the previous four years. The beginning of 2021 continues with a slight increase following a sharp increase during the summer months. The last data from 2022 show that this trend continues and the situation is slowly but surely coming back to the pre-pandemic period. The most significant improvement proving this point is shown in the busy summer season starting from May till October 2022 (Figure 2) (State Statistical Office, 2022).

Consistent with previous years, the first two months of 2020, the last two pre-pandemic months for North Macedonia, had growth in the number of incoming international tourists: 21% growth in January and 10% growth in February. As Covid-19 spread, however, the measures aimed at containing it, brought the tourist sector to an abrupt halt. As a consequence, in March 2020, there was a decrease in the number of international tourists by 26,464 tourists, compared to March 2019, which was a decline of 70%. In April, that number was even higher as a result of the pandemic, when only 171 international tourists visited North Macedonia, a fall of 59,747 tourists from the previous year and bringing the sector to a standstill. The picture was not much better in May as there were 183 international tourists, 68,697 less than the previous year. Albeit

in the following months the borders opened up and numbers went up, they were still even worse as in June there were 87449 fewer international tourists, for July 92,675 and August 92,937, and so on. The trend continued throughout the rest of 2020 and the beginning of 2021. As mentioned before, the first steps of recovery started to be noticed with the opening of the summer season in May 2021 and have so one continued in the right direction. The last available data from October 2022 show a difference of only 15,471 international tourists less compared to October 2019, which is the smallest monthly comparison difference since the start of the pandemic in March 2020 (Figure 2) (State Statistical Office, 2022).

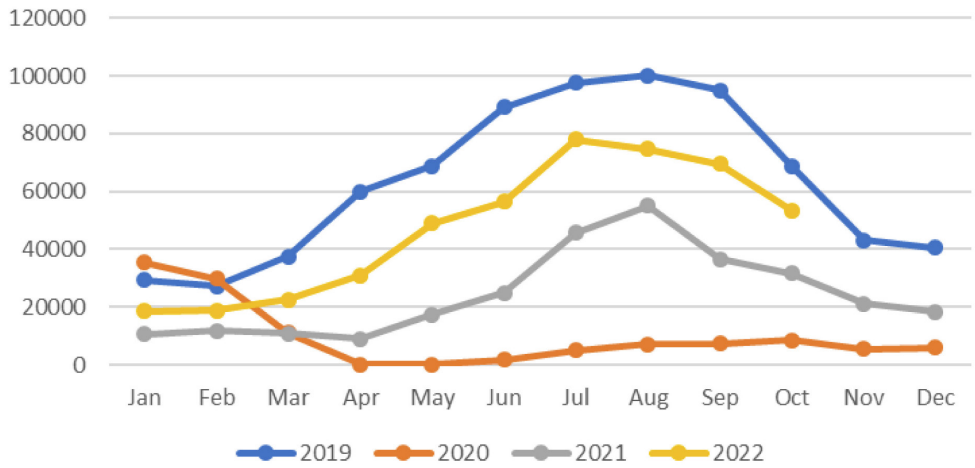

Figure 2. Number of International Tourists in North Macedonia (2019-22)
Source: State Statistical Office, 2022

Through quantifying the amount of revenue generated per international visitor, the study estimates the number of losses in revenue from the lower inflow of international tourists. In 2019, international tourists contributed 433 million USD in tourism (WTTC, 2022). Considering that in 2019 there were 757,593 international tourists in North Macedonia, 572 USD per international tourist flowed into the tourism sector. In 2020, international tourists contributed 262.8 million USD in tourism with 118,206 international tourists in North Macedonia, i.e. on average 2,223 USD spending per international tourist. The data from 2021 show that international tourists have contributed to the country's budget with 377.1 USD. Having in mind that the number of international tourists in 2021 was 293,963, the spending per international tourist for 2021 is 1,283 USD on average.

Despite the sharpest decline in April and May 2020 when there was a decline of 99.7% compared to the same period in 2019, the tourist sector has had the least amount of loss. The loss in April 2020 compared to April 2019 was approximately 34 million USD, while that of May 2020 compared to May 2019 was a 39 million USD loss. In total, during these two months with the lowest number of international tourists, North Macedonia has lost 73 million USD in international receipts. Nevertheless, the largest losses in revenue were at the peak of the holiday season, June, July and August 2020, with losses of 50 million USD, 53 million USD and 53 million USD respectively. In total, for 2020, compared to 2019, there has been a loss of 365.7 million USD for North Macedonia's budget (Figure 3) (State Statistical Office, 2022; WTTC, 2022).

Looking at the expenditure structure, the amount of revenue that each category has lost by the decline in the number of international tourists can be calculated. As such, the category that has lost the most revenue is the Other needs (entertainment, recreation, health, etc.), with a total estimated loss of 46.4 million USD, followed by Shopping in stores with 41.4 million USD, Food

and Beverages with 40.8 million USD, Accommodation services with 25.3 million USD estimated loss and last, Fuel and road tolls with a loss of 16.3 million USD (State Statistical Office, 2022) (Figure 4).

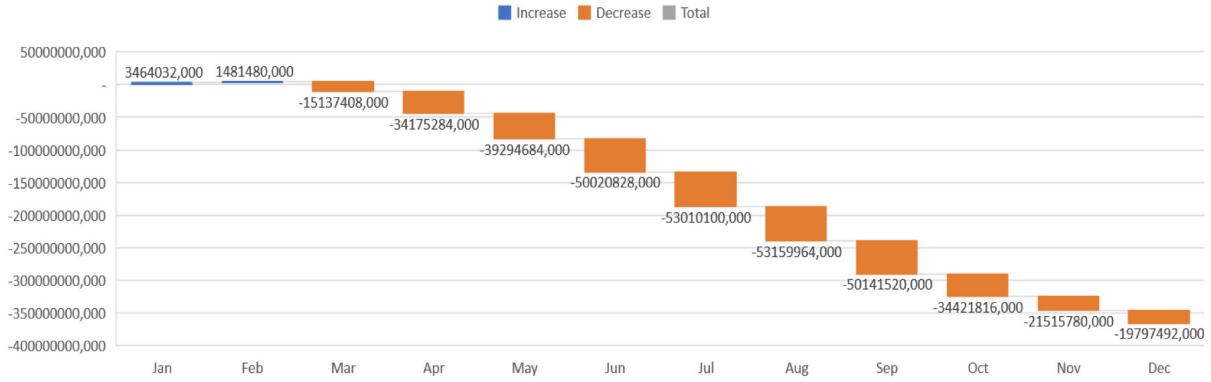

Figure 3. Loss of International Tourists Receipts, up to August (in USD)
Source: State Statistical Office, 2022; WTTC, 2022; authors' calculations

Figure 5 represents the expenditure structure of international tourists, based on which impacts have been assessed. The loss from other needs like entertainment, recreation, and health, accompanied 27.6% of the total loss as a result of the pandemic in 2020. Following were Shopping in stores with a 24.32% of loss, Food and beverages with a 23.96% of loss, Accommodation services with a 14.88% of loss, and Fuel and road tolls with a 9.57% of loss (State Statistical Office, 2022).

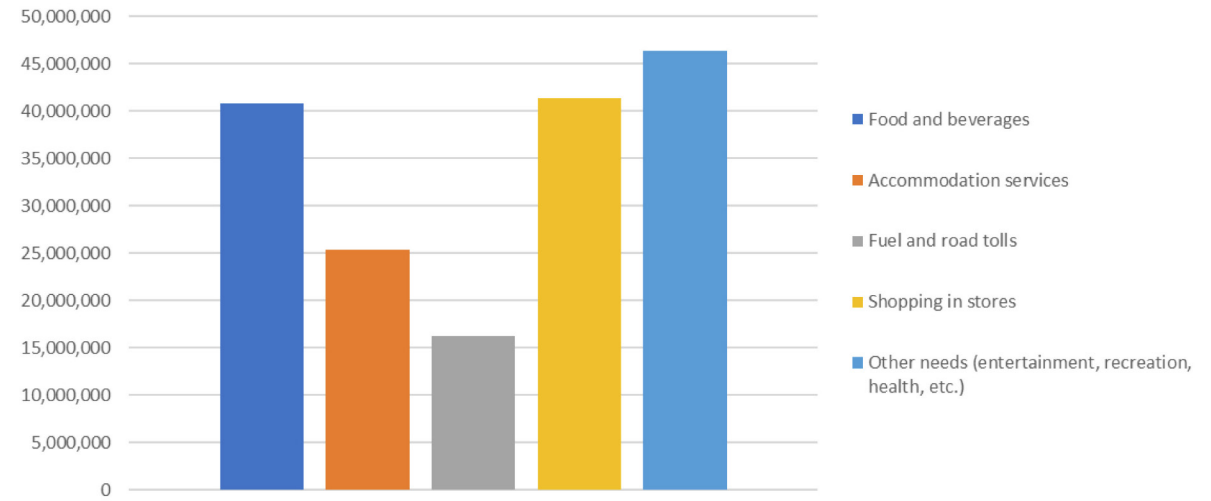

Figure 4. Results, loss by sectors, up to August (in USD), 2019-20
Source: State Statistical Office, 2022; Calculations: Authors, 2022

By comparing the changes in incoming international tourists' year on year the study was able to quantify an estimated loss of revenue for each region of North Macedonia. The two regions that stand out are the two regions with the most developed tourism, namely Skopje and Ohrid (Southwest region). Skopje with an estimated loss of revenue of 94 million USD and Southwest region with an estimated loss of revenue of 81 million USD. The Northeast region and the East region show the least amount of revenue loss possibly because in these regions international tourists are more expats whose arrival is not as affected as much as tourists who come for leisure (Figure 6) (State Statistical Office, 2022).

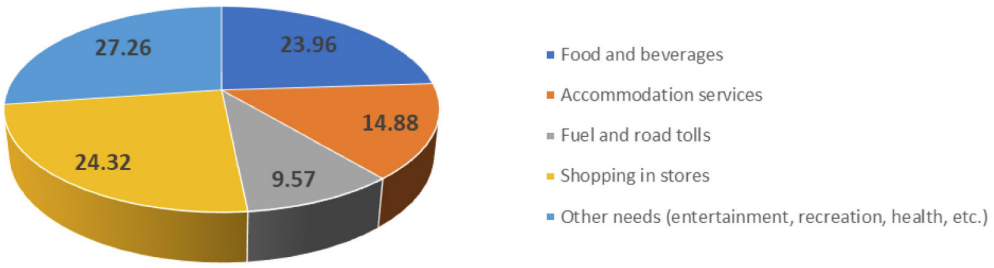

Figure 5. International tourists' expenditure breakdown (2019-20)
Source: State Statistical Office, 2022

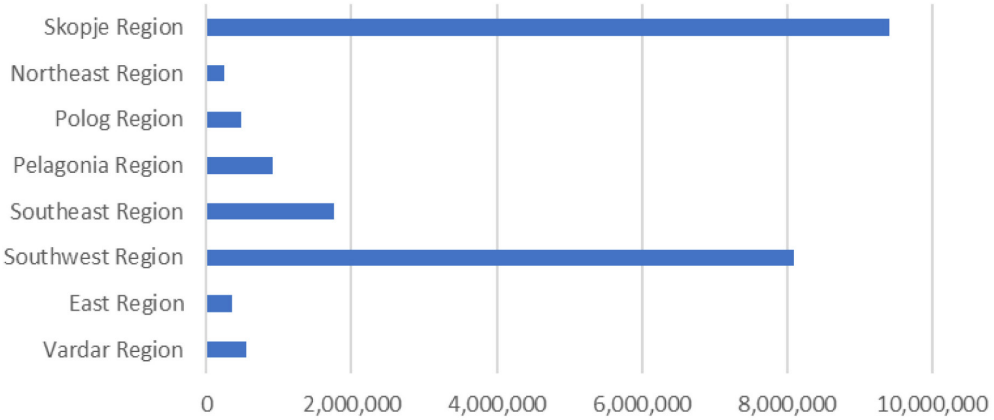

Figure 6. Loss of International Tourists Receipts up to August (in USD), by region, 2019-20
Source: State Statistical Office, 2022; Calculations: Authors, 2022

4. CONCLUSION

North Macedonia suffered from the loss of international tourists during the pandemic period 2020-22. Although this loss was not as severe as in the regional countries, still it affected the budget. Travel and tourism revenues as % of GDP from 6.6% in 2019 decreased to 4.8% in 2020 and 5.6% in 2021. This loss was highest in the sectors of foods and beverages, shopping in stores and other needs like entertainment and recreation. In terms of the regional losses, Skopje and the Southwest region felt this loss of international tourists most severely. Considering that this study is limited to international tourists, the impact could be made more or less severe depending on the spending choice of domestic tourists. In case domestic tourists were discouraged from spending, the loss would be more severe. On the other side, if domestic tourists were more encouraged to travel within the country as a result of the closed borders, this would make up for the loss of revenue from international tourists. Moreover, considering that the study takes an average flat rate of 572 USD generated from each tourist, their spending in North Macedonian regions could be different. To that avail, this study encourages more in-depth, qualitative research to get a better picture of the impact that Covid-19 has induced on the economy in North Macedonia.

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Enogastronomic Experience: A State-of-the-Art-Review

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Abstract: *The specificity of food and wine in a particular region can serve as a motive that connects consumers to a particular geographic area. Therefore, the enogastronomic experience is a perfect postulate combining gastronomy and enology for consumers. This research aimed to conduct an in-depth analysis of previous research and obtain a comprehensive picture of the enogastronomic experience of consumers. The result of the empirical research shows that most studies on the enogastronomic experience were published in 2020 (25.53%) and in Spain (17.02%), while the cluster analysis showed that "food" and "satisfaction" are the most frequently used keywords. It is also worth highlighting that almost half of the research in the field of restaurateurs is from the perspective of consumers (40.42%). The results of this research can help both researchers and practitioners engaged in the field of enogastronomy to better cope with the challenges of competition in the market.*

1. INTRODUCTION

Experience is the search for happiness or well-being (Sharpley & Stone, 2012) - the response of consumers to a desired social and psychological benefit (Kim Lian Chan & Baum, 2007). From the perspective of the enogastronomy, food and wine services provide the experiences and emotions that individuals believe they should have on holidays (Carvalho et al., 2021; Johns & Kivela, 2008). In addition, gastronomic (Davras & Özperçin, 2021; Gupta & Duggal, 2021; Hashemi et al., 2021; Jang & Cho, 2022; Vesci & Botti, 2019) and wine experiences (Park et al., 2019; Pelegrín-Borondo et al., 2020; Wen & Leung, 2021) were identified as predictors of consumers' behavioural intentions.

While there are studies that examine consumers' gastronomic and wine experiences, there is no study that addresses the outcomes of enogastronomic experiences. Therefore, this study aims to improve the existing knowledge about the enogastronomic experience economy. The specific objectives of this review of enogastronomic studies are to carry out: (1) analysis by year, (2) geographical analysis, (3) analysis by type of research, (4) keyword clustering analysis, and (5) analysis by business subject. The approach used in this study facilitated the systematization and critical analysis of previous literature on the enogastronomic experience conducted in the last five years, to provide a better understanding of the mentioned issues. The findings of this study can help both researchers and practitioners engaged in the field of enogastronomy to better cope with the challenges of the market. This review article consists of five sections. The introduction is followed by methodology, results, conclusions and references.

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2. METHODOLOGY

To synthesize the relevant scientific literature on the enogastronomic experience of consumers, a systematic quantitative literature review was used, consisting of five stages (Khoo-Lattimore et al., 2019): (a) establishing the review aims; (b) identifying search terms (keywords), databases and literature selection criteria; (c) searching databases and defining inclusion criteria; (d) presenting research results in graphical and tabular form; and (e) analyzing summary tables.

This study intended to obtain a comprehensive picture of previous studies on the enogastronomic experience of consumers, conducted within the last five years, to identify current needs. For the systematic review of the relevant literature, the authors applied three selection criteria. First, studies published between 2018 and 2022 were analyzed in the ScienceDirect database using the keywords "Gastronomic tourism experience," AND "Wine tourism experience". Second, only complete peer-reviewed research and review studies were considered in the analysis, excluding books, research notes, conference proceedings, reports, professional papers, and dissertations. Third, the top five journals with the highest number of published studies in the hospitality management field were included in the analysis. These were *International Journal of Gastronomy and Food Science* (17), *Journal of Destination Marketing & Management* (14), *International Journal of Hospitality Management* (11), *Tourism Management* (10), and *Journal of Hospitality and Tourism Management* (9). In the initial search, 61 studies were considered appropriate to continue to the next step. Since ScienceDirect's search engine analyses only the titles of the studies, the authors analyzed the abstracts to identify the studies of interest. When the abstracts were analyzed, it was found that 14 studies did not correspond to the selected keywords, since only one keyword, "tourism", was included in the titles. At the end of the collection phase, 47 studies were selected for review.

For the purpose of this research, analysis by year, analysis by type of research, geographical analysis and keyword clustering analysis were carried out. The four analyzes were carried out using descriptive statistical methods with SPSS software. The graphical method was applied to present the results of analysis by year, and the tabular method was to present the results of analysis by enogastronomic entity and by type of research. MapChart was used to display the results of the geographic analysis. VOSviewer software was used to create, visualize, and explore bibliometric maps (Van Eck & Waltman, 2010) of the keywords of the selected studies.

3. RESULTS

This section presents the results of the systematic quantitative literature review on the topic of the enogastronomic experience of consumers. Methods of descriptive and multivariate statistics were applied in the quantitative analysis of studies, based on which, results were obtained for analysis by year (Figure 1), geographical analysis (Figure 2), analysis by type of research (Table 1), keyword clustering analysis (Figure 3) and analysis by a business entity (Table 1).

Based on the presented results of analysis by year, it is evident that studies of enogastronomic experience began to appear more frequently from 2018 onwards, culminating in 2020 (25.53%). After that year, the number of published studies in the overall ranking dropped in 2021 (17.02%) and 2022 (10.64%). The largest number of studies in the sample were published in *IJGFS* (25.53%) and *JDMM* (23.40%), followed by *IJHM* (19.15%), *TM* (17.02%), and *JHTM* (14.89%). In addition to the previously performed analysis, an analysis of the geographical coverage was carried out.

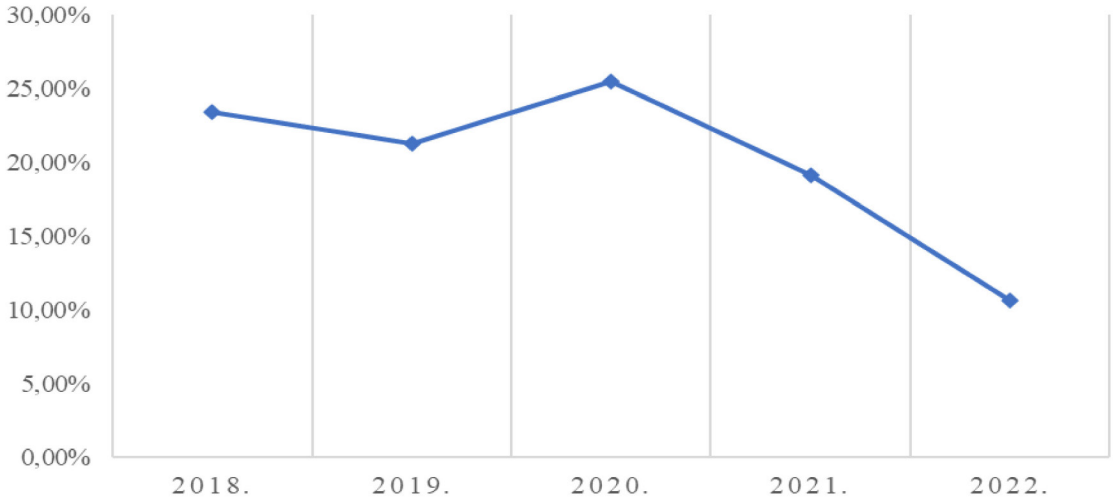

Figure 1. Analysis by year (2018 – 2022)
Source: Authors' research

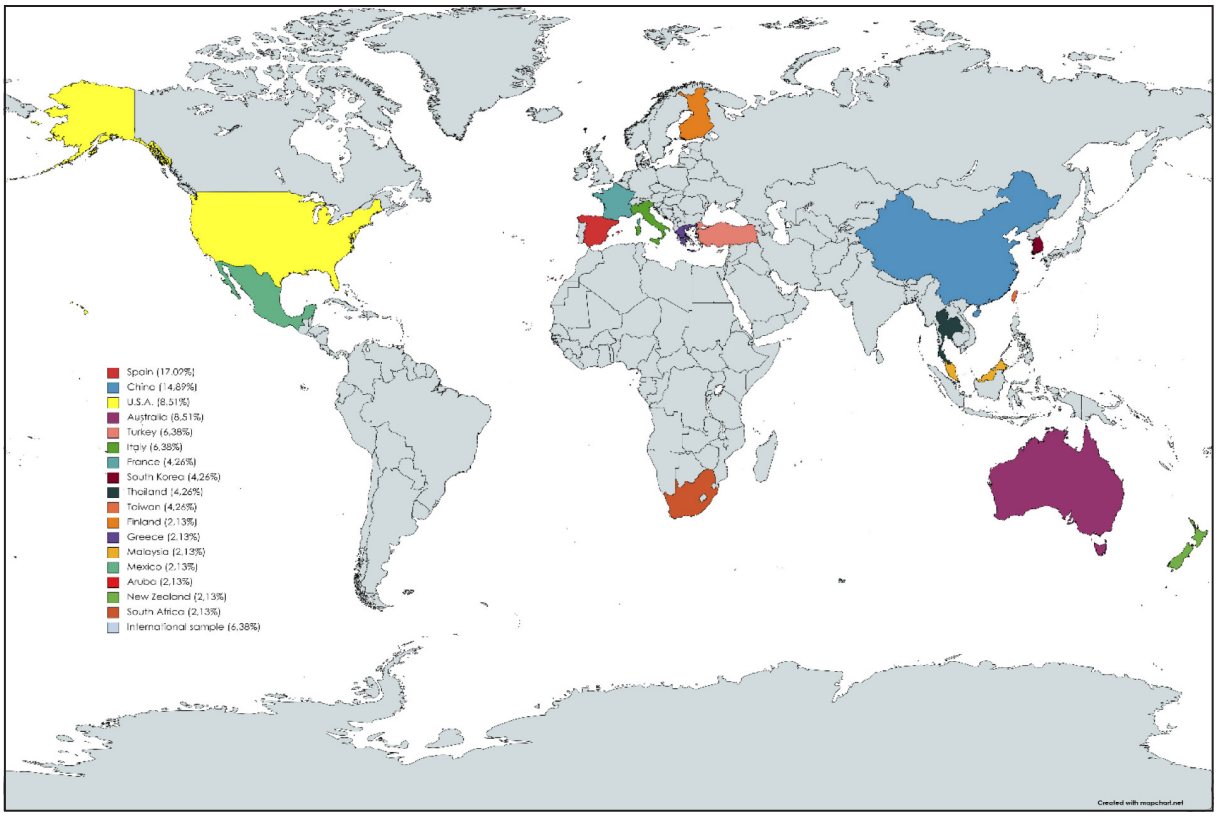

Figure 2. Geographical analysis
Source: Authors' research

Geographical analysis was performed to determine the degree of representation of countries in which studies on enogastronomic experiences of consumers were conducted. The analyzed data presented in Figure 2 shows that most of the studies were carried out in Spain (17.02%), China (14.89%), the U.S.A. (8.51%), Australia (8.51%), Turkey (6.38%) and Italy (6.38%). In addition to these countries, the sample also included France (4.26%), Taiwan (4.26%), Thailand (4.26%), South Korea (4.26%), Greece (2.13%), Finland (2.13%), Malaysia (2.13%), Mexico (2.13%), Aruba (2.13%), New Zealand (2.13%) and South Africa (2.13%). Of the studies, 6.38% were conducted at the national level. Geographical distribution by continent shows that

the greatest number of studies were conducted in Europe (38.30%) and Asia (29.79%), followed by North America (10.64%) and Oceania (10.64%), while the least number of studies were conducted in South America (2.13%) and Africa (2.13%).

Table 1 shows the results of the research type as follows:

Table 1. Analysis by type of research

Type of research approach	Source	*f*	%
Quantitative approach	(Berbel-Pineda et al., 2019; Bertan, 2020; Choe & Kim, 2019; DiPietro et al., 2019; Hernandez-Rojas et al., 2021; Hsu & Scott, 2020; Jang & Cho, 2022; Jia & Chaozhi, 2021; Kiatkawsin & Han, 2019; Lai, 2020; Lu & Chi, 2018; Martín et al., 2020; Mora et al., 2021; Park et al., 2019; Promsivapallop & Kannaovakun, 2019; Reynolds et al., 2018; Ting et al., 2019; Toudert & Bringas-Rábago, 2021; Vesci & Botti, 2019; Viljoen & Kruger, 2020; Wen & Leung, 2021; Zhang et al., 2018)	22	46.81
Qualitative approach	(An & Alarcón, 2021; Baldwin, 2018; Björk & Kauppinen-Räisänen, 2019; Casadó-Marín & Anzil, 2022; Duan et al., 2020; Ellis et al., 2018; Gebbels et al., 2021; Horng & Hsu, 2020; Lee et al., 2022; Matson-Barkat & Robert-Demontrond, 2018; Mehraliyev et al., 2020; Meneguel et al., 2019; Moshin et al., 2020; Okumus & Cetin, 2018; Pavlidis & Markantonatou, 2020; Sgroi et al., 2022; Ueda & Poulain, 2021)	17	36.17
Mixed approach	(Chang & Mak, 2018; Choe & Kim, 2018; Gallarza-Granizo et al., 2020; Kustos et al., 2019; Lai et al., 2018; Lee et al., 2018; Luoh et al., 2020; Shi et al., 2022)	8	17.02

Source: Authors' research

The analyzed data presented in Table 1 show that the largest number of authors applied a quantitative approach (46.81%) to their research on the enogastronomic experience, by using a questionnaire as a measuring instrument in surveying consumers (44.68%). Only one quantitative study, that of Lu and Chi (2018), used the experimental technique (2.13%). Studies applying a qualitative approach accounted for 36.17% of the sample. These studies mostly used the interview method (14.89%) and content analysis (4.26%). Techniques such as netnography, cognitive maps, interpretive case studies and sentiment analysis appeared only once in the sample (2.13%). Importantly, many different techniques were applied in three qualitative studies. For example, Moshin et al. (2020) included discussion groups, content analysis, word clouds, and narrative analysis; Meneguel et al. (2019) used observation, in-depth interviews, and content analysis; and Casadó-Marín and Anzil (2022) used observation, in-depth interviews, and focus groups. Although the mixed-method approach is the least represented in the sample (17.02%), the results of these studies are extremely important because they provide researchers with insights into both subjective and objective components. Most often, a combination of interview and survey techniques was applied in the mixed-approach studies (6.38%). The previous analysis is followed by the results of keyword clustering (figure 3).

By applying cluster analysis in the VOSviewer programme, three clusters were identified, containing a total of 11 variables and 38 links with a total strength of 101. The distance between keywords reflects their link strength, which was normalized by the LinLog/modularity method. It can be noted that the keywords "satisfaction" and "food" are the most frequently used keywords in the analyzed literature. The first cluster, colored red, contains the highest number of keywords (5), with the strongest association between "food" and "satisfaction". The second,

green cluster contains four keywords, with the strongest link between behavioral intention and experience, as the link here is the shortest. The third cluster, colored blue, is the smallest and contains only two keywords, indicating methods used in research related to culinary tourism. After keyword clustering, the analysis by the enogastronomic entity is presented in the table that follows.

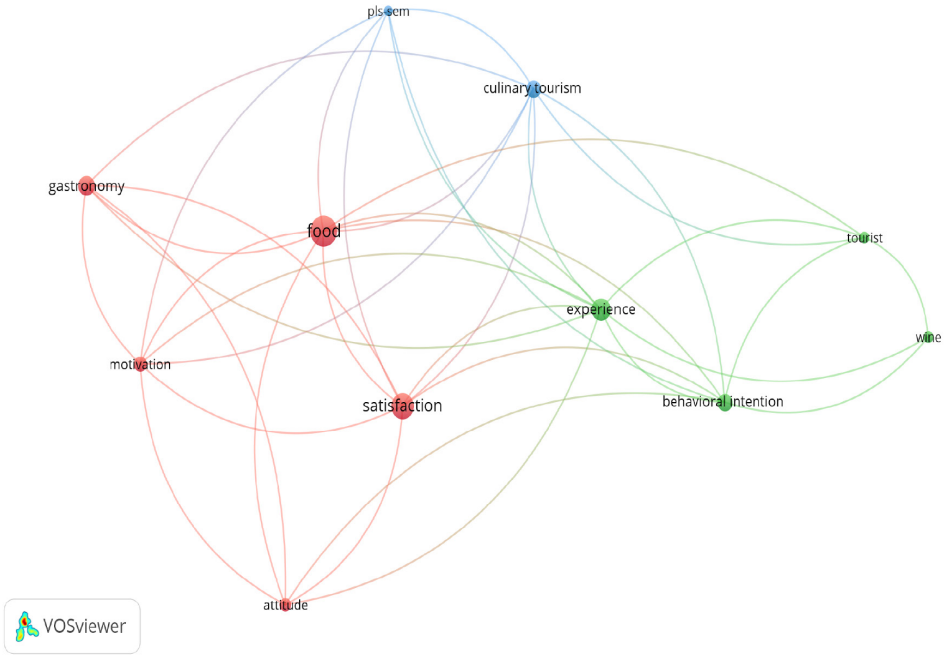

Figure 3. Keyword clustering analysis

Source: Authors' research

Table 2. Analysis by enogastronomic entity

Entity	Perspective	Source	*f*	%
Restaurant	Consumers	(Bertan, 2020; DiPietro et al., 2019; Hernandez-Rojas et al., 2021; Kiatkawsin & Han, 2019; Lai, 2020; Lu & Chi, 2018; Mehraliyev et al., 2020; Mora et al., 2021; Promsivapallop & Kannaovakun, 2019; Toudert & Bringas-Rábago, 2021; Zhang et al., 2018; Gallarza-Granizo et al., 2020; Kustos et al., 2019; Baldwin, 2018; Gebbels et al., 2021; Horng & Hsu, 2020; Matson-Barkat & Robert-Demontrond, 2018; Meneguel et al., 2019; Lee et al., 2022)	19	40.42
	Consumers and experts	(Ueda & Poulain, 2021)	1	2.13
Event	Consumers	(Vesci & Botti, 2019; Viljoen & Kruger, 2020; Lee et al., 2018; Luoh et al., 2020)	4	8.51
	Consumers and experts	(Reynolds et al., 2018; Moshin et al., 2020)	2	4.26
Winery	Consumers	(Park et al., 2019; Wen & Leung, 2021; Duan et al., 2020)	3	6.38
	Consumers and experts	(Casadó-Marín & Anzil, 2022)	1	2.13
Unspecified	Consumers	(Berbel-Pineda et al., 2019; Choe & Kim, 2019; Hsu & Scott, 2020; Jang & Cho, 2022; Martín et al., 2020; Ting et al., 2019; Chang & Mak, 2018; Choe & Kim, 2018; An & Alarcón, 2021; Ellis et al., 2018; Pavlidis & Markantonatou, 2020; Shi et al., 2022; Okumus & Cetin, 2018; Björk & Kauppinen-Räisänen, 2019)	14	29.79
	Experts	(Jia & Chaozhi, 2021; Lai et al., 2018; Sgroi et al., 2022)	3	6.38

Source: Authors' research

Enogastronomic tourism involves consumers visiting local producers, festivals, restaurants, wineries and/or other places in a tourist destination, where food and wine (beverages) are consumed. Hence, the selected studies were analyzed according to the type of enogastronomic entity visited. The analyzed data revealed that the greatest number of studies were carried out in a restaurant setting (42.55%), from the consumer's perspective (40.42%). Studies involving events, such as enogastronomic festivals, conferences and culinary workshops, accounted for 12.77% of the sample. Of these studies, 8.81% focused on investigating the enogastronomic experience from the consumer perspective. Wineries, as the venues of the experience, were the subject of 8.51% of the studies, which centered more on the consumer perspective (6.38%) than on the perspectives of other stakeholders (2.13%). More than a third of the studies (36.17%) included in the sample did not specify the setting – restaurant, winery and/or festival – in which the research was carried out.

4. DISCUSSION AND CONCLUSION

Considering that consumers spend about 25% of their travel budget on food and beverages (Wilkinson, 2016), it is evident that enogastronomy plays a significant role in attracting and retaining consumers. Most research has inevitably been conducted in the field of restaurateurs from the perspective of the consumer, but there are also studies conducted in the context of wine and event tourism. Therefore, it is not surprising that the findings of this literature review contribute in a practical sense to enogastronomic providers such as restaurateurs, winemakers and festival organizers. Based on the analyzed data, the previously mentioned providers would gain insight into the relevant results that could help them focus on long-term business improvement. However, it should be noted the lack of conducted studies of enogastronomic experience from the perspective of experts.

This study includes 47 papers on the enogastronomic experience, published in *IJGFS*, *JDMM*, *TM*, *IJHM* and *IHTM* in the period 2018 – 2022. Previous reviews of the literature on gastronomic and wine tourism have included articles up to 2018 (Amarando et al., 2019; Gómez et al., 2019; Rodríguez-López et al., 2020), while this systematic quantitative review is based on contemporary enogastronomic articles up to 2022. The representation of enogastronomy articles by year follows Price's theory of four periods of growth of the scientific field: (1) field attracts the attention of a small number of researchers; (2) the number of interested researchers is growing; (3) culmination and strengthening of the researcher's interest; (4) maturing and declining interest of researchers (Barrios et al., 2008). The articles covered a wide geographical range, and most researchers dealt with this topic in Spain. This finding is expected considering that Spain is one of the most visited Mediterranean countries (Perry, 2003). The quantitative approach was most intensively applied in studies of enogastronomic experience, which is surprising given the subjective and holistic nature of the investigated phenomenon. The aforementioned significant quantification represents an objective approach, while the experience is a subjective phenomenon that depends from person to person. In this research, keyword analysis identified three clusters according to which the greatest association was observed between food and satisfaction keywords. Gómez et al. (2019) came to similar findings in their review of the literature on wine tourism, where satisfaction was also the most frequently mentioned keyword.

Although the obtained research results provide in-depth insight into the enogastronomic experience of consumers, this study nevertheless has certain limitations. One limitation is that the

study only considered papers written in the English language and published on the ScienceDirect online database from the top five scientific journals that were the most engaged in the topic. Given that only a meagre sample of 47 studies was collected, the recommendation to future scholars is to include a greater number of studies by searching other databases such as Google Scholar and Emerald Insight. The meagre sample was also the result of the timeframe as an elimination criterion; namely, a short period of five years (from 2018 to 2022) was taken into consideration. Hence, the suggestion to future scholars is for the search to encompass a longer period. To paint a comprehensive picture of the researched topic, it is recommended to apply other bibliographic quantitative and qualitative techniques in the analysis, such as cognitive mapping and sentiment analysis of keywords. Since a lack of enogastronomic research has been identified from the perspective of experts in the field of restaurateurs, wineries and festivals, it is suggested that future research focus its attention in this direction.

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