UNIVERSITY OF LJUBLJANA
SCHOOL OF ECONOMICS AND BUSINESS

MASTER THESIS

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THE RELATIONSHIP BETWEEN ENVIRONMENTAL, SOCIAL AND GOVERNANCE SCORES AND SOVEREIGN CREDIT RATINGS

Ljubljana, July 2024 POLINA SEMCHENKO

AUTHORSHIP STATEMENT

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LIST OF ABBREVIATIONS

BEV – Battery Electric Vehicle

CDS – credit-default swap

CEO – Chief Executive Offcier

CO2 – Carbon Deoxide

CMA – Competition and Markets Authority

CPI – consumer price index

CRA – credit rating agencies

CSR – corporate social responsibility

EGD – Europena Green Deal

ESG – Environmental, Social, Govermenance

ESMA – European Securities and Markets Authority

ETF – exchange-traded fund

EU – Europena Union

EV – Electric Vehicle

FDI – foreign direct investments

GDP – Gross Domestic Product

GFC – Global Financial Crisis

GGND – Global Green New Deal

GRI – Global Reporting Initiative

CSRD – Corporate Sustainability Reporting Directive

HR – Human Resources

ICE – internal combustion engine

IFSI – Investing for Sustainability Impact

ILO – International Labour Organization

IMF – International Monetary Fund

IPO – Initial Public Offer

ISSB – International Sustainability Standards Board

JTM – Just Transition Mechanism

KPI – Key Performance Indoctors

OECD – Organisation for Economic Cooperation and Development

PR – Public Relation

PRB – Principles for Responsible Banking

PSI – Principles for Sustainable Insurance

PRI – Principles for Responsible Investment

TFEU – Treaty on the Functioning of the European Union

S&P – Standard and Poor's (credit rating agency)

SCR – sovereign credit rating

SEC – Securities and Exchange Commission

SDG – Sustainable Development Goals

UK – United Kingdom

UN – United Nations

UNCED – United Nations Conference on Environment and Development

UNEMG – United Nations Environment Management Group

UNEP – United Nations Environmental Program

UNEP FI – United Nations Environment Programme Finance Initiative

USA – United States of Amreica

VIF – Variance Inflation Factor

WCED – World Commission on Environment and Development

1 INTRODUCTION

Today, the Environmental, Social, and Governance (ESG) concept has emerged as a widely used term, signifying a new economic paradigm and a comprehensive theoretical and practical framework for the economic system. This framework considers not only financial aspects but also ESG factors in economic decision-making. Consequently, the shift to this paradigm, commonly known as the green transition and sustainable development, is often likened to a new industrial revolution. This transition is anticipated to bring about significant changes across all facets of business and the operations of various economic institutions (Metawa, 2022).

In recent times, the focus on ESG issues has heightened, triggered by a series of global crises such as financial crises, the COVID-19 pandemic, and energy crises that have significantly impacted the world over the last 15 years (Hirai & Comim, 2022). The primary mechanism for implementing this new strategy is the concept of sustainable development, involving the simultaneous and intensive development of all three elements: environmental, social, and governance. It is a common misconception that sustainable development solely pertains to environmental concerns. In reality, contemporary thinking has shifted away from this one-sided interpretation of the concept. ESG, however, encompasses a much broader and intricate framework in which the elements of E, S, and G are closely intertwined, and the promotion of one element heavily depends on and substantially influences the success and effectiveness of the others.

For this reason, the sustainable development framework was designed to address contemporary challenges more effectively, fostering a quicker pace of the green transition, social progress, and governance development. To support this initiative and translate it into practical economic applications, the concept of ESG management was introduced (Ting-Ting et al., 2021), and green financial markets were established. These markets primarily trade green bonds, although in the last five years, social and governmental bonds have also emerged. Through the issuance of these financial instruments, governments and companies can realize several significant advantages, including enhancing their reputation, attracting new investors, and securing resources for ecological and social projects on favourable terms (Jankovic et al., 2022).

However, despite a decade of active development and the global increase in awareness regarding the significance of the sustainability agenda, the new-generation financial markets are still in their early stages of establishment and have yet to attain the same level of investment appeal as traditional markets (Sangiorgi & Schopohl, 2021). Governments in various countries have only recently started to engage with green financial instruments and have yet to fully recognize them as a substantial component of their financial and economic policies (Bissoondoyal-Bheenick, 2005).

This issue presents a considerable challenge to the effective advancement of the sustainability concept. Consequently, one of the most intricate and demanding objectives for the scientific community today is to develop a measurement framework that considers the ESG aspects on a governmental level and serves as an additional incentive for furthering sustainability efforts (Zheng et al., 2022).

In this context, sovereign credit ratings (SCR), as a specifically developed assessment reflecting a country's creditworthiness, could serve as a highly relevant benchmark for political leaders of nations. This is because it constitutes a critical indicator for the overall assessment of a state's investment attractiveness, which, in turn, is a crucial measure determining a country's standing on the global political, economic stage, and international financial markets (Athari et al., 2021; Marchewka, 2022). Monitoring and maintaining this rating can empower governments to sustain their economic competitiveness, foster the process of technological innovation, bolster the nation's financial capacity, stimulate domestic competition, improve the business climate within the country, and attract foreign direct investment (FDI) for various projects (Asafo-Agyei & Kodongo, 2022). The latter is of particular significance when searching for additional financial resources to support sustainable initiatives.

Despite the fact that the majority of politicians, corporate management, and investors tend to only nominally embrace the ideals of sustainability, with their real economic activities often neglecting ESG concerns, a limited body of research suggests that ESG factors could serve as a new catalyst for enhancing SCR and significantly contributing to their stability (Kiesel & Lücke, 2019; Boubaker et al., 2020; Becker et al., 2022; Lööf et al., 2022).

This supposition is grounded in the fundamental logic underpinning the entire sustainability development process. An expanded perspective reveals that addressing this issue comprehensively could lead to a ‘wave effect’ that impacts all sectors of the global economy. This encompasses the green transition, socially responsible development, and the formulation of transparent and effective management practices, all of which play pivotal roles in shaping the future economic landscape.

First, the transition to a carbon-neutral economy is anticipated to generate up to 200 million new jobs, according to McKinsey's projections. This growth is expected to result from the redistribution of employment opportunities from outdated sectors to regions where zero-emission enterprises will establish new production facilities, consequently boosting local economies (McKinsey, 2012).

Second, the adoption of new production processes will necessitate the development of innovative technologies, the production of new equipment, and the construction of new plants and factories. The economy may more than double its current level of activity to meet the demands of this evolving system and provide the essential infrastructure and resources.

This transformation could not only increase job opportunities but also require workforce re-education, potentially leading to higher wages and contributing to the development of social and conventional infrastructure in countries with emerging economies.

Thirdly, an upsurge in scientific activity is anticipated due to the growing demand for cutting-edge machinery and technological innovations. Furthermore, improvements in working conditions, social procurement, and governmental transparency are poised to enhance workforce productivity and the effectiveness of executive boards. In turn, these developments could elevate the quality, profitability, and efficiency of economic activities to an entirely new level.

In summary, the sustainability transition process is expected to have an unprecedented, all-encompassing impact on the economy of each nation committed to the sustainability path. It may unleash a powerful wave of global economic growth, boosting the Gross Domestic Product (GDP) of countries, accelerating their growth rates, enhancing their capacity to produce more goods and services, and elevating their overall quality. As a result, this may contribute significantly to the overall well-being of their populations (Teixeira et al., 2018).

Economic expansion within a country induced by the green transition will undoubtedly have a significant impact on its sovereign credit rating (SCR), as numerous research papers have demonstrated. Economic growth stands as one of the major determinants of SCR (Cantor, Parker, 1996; Mellios, Payet, 2006). However, this is just one link in the chain. Economic growth influences various aspects of economic reality and also results in an increase in output per capita, a classical driver of SCR (Afonso et al., 2011; Gaillard, 2012). Ultimately, one can reasonably anticipate an overall enhancement of economic development, a factor consistently taken into account by credit rating agencies in their assessment procedures (Canuto et al., 2012; Reusens & Croux, 2017).

Therefore, based on the literature analysis presented below, it can be hypothesized that promoting ESG factors at a country level could potentially emerge as a new driver of its investment attractiveness, thereby directly influencing its sovereign credit rating and leading to an increase in the rating (Pineau et al., 2022; Boubaker et al., 2020; Kiesel & Lücke, 2019). However, it is worth noting that the number of relevant articles addressing this issue remains limited, highlighting a significant knowledge gap (Pineau et al., 2022).

The purpose of my master’s thesis is to contribute towards reducing this knowledge gap by examining the relationship between countries’ sustainability policies, as assessed through their ESG scores, and their sovereign credit ratings (SCR). Existing literature suggests that the question of whether a country's ESG score affects its credit rating remains underexplored. However, it is reasonable to expect that countries with higher ESG scores could potentially have better credit ratings. Additionally, considering the existing economic, scientific, social, and political disparities between developed and developing countries, it is plausible to

hypothesize that the effect of ESG promotion could be more pronounced in developed nations. My research's primary objective is to test these hypotheses.

To accomplish the objectives of this study and validate the hypotheses put forward, I employ the methodology of multiple regression modelling using data collected from several sources. The selection of this methodology is in line with common practices in this research field (Canuto et al., 2011; Hadzi-Vaskov & Ricci, 2019; Michalski & Low, 2021; Pineau et al., 2022). In order to conduct the empirical part, R Studio was employed for the calculation of descriptive statistics, regression model coefficients, and to perform necessary statistical tests. Additionally, ChatGPT was used to enhance the grammar and style of the paper.

In addition to the Introduction and Conclusion, my master's thesis contains four chapters. The second chapter of this master's thesis will provide a comprehensive exploration of the sustainability concepts, encompassing four parts with the examination of sustainable development, sustainable finance, the green economy and green transition, and finally, ESG frameworks. The third chapter will delve into the sustainability impacts and will consist of two sub-chapters about positive and negative aspects. The third chapter will scrutinize the practice of SCR, offering an overview of its key determinants. Subsequently, a thorough analysis of existing literature will be conducted to select the most suitable methodology, including the research model and determinants for the equation. The fourth chapter will focus on the existing knowledge on the topic of the relationship between ESG and credit ratings. The next chapter will cover the practical aspect of the study, featuring the description of the assembled database and the execution of the econometric model. The final chapter of the work will unveil the results obtained, followed by their interpretation. In the conclusion, unconventional findings will be discussed, and potential avenues for future research will be explored.

2 SUSTAINABILITY CONCEPTS

Consideration of the ESG concept should commence with a comprehensive definition of this framework. It is common to associate the term primarily with the 'E' for environmental component, often overlooking the significance of the other two equally important aspects.

In a broad sense, ESG is the sustainable development of commercial activities, which is based on the following principles:

- Responsible attitude to the environment (E - environment);
- High social responsibility (S - social);
- High quality of corporate governance (G - governance) (Haixu et al., 2023).

The term ESG took its current form only in the mid-2000s, despite the inception of the initial ideas for this comprehensive framework dating back to the early 20th century. These ideas have continued to undergo intensive development. In the realm of academia, the UN report 'Who Cares Wins' in 2004 is regarded as one of the first official documents to introduce the abbreviation ESG to a global audience.

The upcoming chapter will provide an in-depth discussion of all three ESG components.

2.1 Sustainable development

Until recent years, the attention given to the relationships between the economy and ecology was notably inadequate. However, today it has become evident that our linear (as opposed to circular) approach to economic growth, heavily reliant on the use of fossil fuels, is associated with the escalation of pollution and environmental degradation. This can be substantiated by the depletion of natural resources, disruption of the biosphere's equilibrium, and climate change, all of which limit the possibilities for further development and pose a significant threat to the existence of humanity as a whole.

According to forecasts from the Organisation for Economic Cooperation and Development (OECD), if our societies continue with current production methods and consumption levels, the world could lose between 61 to 72% of its flora and fauna by 2050, compared to 2000. Additionally, natural areas will incur irreversible damage spanning 7.5 million square kilometres. In 2015, based on calculations by the Global Footprint Network, a group of scientists estimated that the planet's annual resources – representing the amount of resources the Earth can sustainably provide and regenerate – were depleted in just 7 months and 13 days. Such calculations have been made by scientists since the 1970s, revealing that annual resources are being depleted at an increasingly accelerated rate each year. In other words, this means that, for instance, in 2015, the volume of resources was exhausted six days earlier than in 2014.

In recent times, there has been a heightened recognition of the urgent need to take action to avert impending catastrophes. Consequently, environmental concerns have been integrated into humanity development concept which nowadays has taken the forefront - sustainable development. This is a broad notion that consists of economic, political and social practices aimed at translating this concept into practical action.

The first attempt to attract awareness to the problem of a sustainable development path was made in 1987 in the report ‘Our Common Future,’ which is today known as the Brundtland Report. In 1983, the World Commission on Environment and Development (WCED) was established under the leadership of Gro Harlem Brundtland, after whom the report was named. This report is acknowledged as the underlying document establishing the framework for all modern ideas, theories, and concepts included in sustainable development.

The report of the Brundtland Commission for the first time explicitly expressed a dire warning about the beginning of environmental change and the need for a transition to a new path of development. Thus, the Brundtland Report defines sustainable development as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (UN, 1987). The challenge of unequal development pace was proclaimed as the key reason for global environmental problems, thus justifying the eradication of this gap to be the underlying principle of sustainable development. The report significantly resonated on a global level and provoked deeper and more serious consideration of environmental problems.

Following in the footsteps of the Bruntland Report, sustainable development gained international prominence in 1992 during the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro. Among its most significant accomplishments was the agreement among governments to formulate national strategies for sustainable development, incorporating measures outlined in the Rio Declaration on Environment and Development and Agenda 21 (Baldwin, 2007). For instance, countries committed to ending unsustainable patterns of production and consumption, promoting the exchange of knowledge, and devising new methods for preserving natural resources (United Nations, 1992).

Currently, environmental concerns have been exacerbated by a series of recent global crises, including financial crises, the COVID-19 pandemic, and energy crises, which have severely rocked the world over the past 15 years. Moreover, ongoing warnings from the international scientific community underscore the pressing need for prioritizing the sustainability agenda on a global scale, as humanity is rapidly approaching the ecological limits of our planet.

In response to these challenges, the United Nations (UN) adopted the new 2030 Agenda (United Nations, 2015) as a follow-up to the Agenda 2021. This new agenda aims to address modern challenges more effectively and accelerate the pace of the green transition. Additionally, a set of 17 Sustainable Development Goals (SDG) has been formulated to enhance the impact of the Agenda, providing individual companies, state institutions, and organizations with a more precise framework for sustainable development (Hirai & Comim, 2022).

2.2 Sustainable finance

With the emergence of the sustainable development concept, a new economic framework known as sustainable finance was conceived. The origins of this term are attributed to the UNCED, commonly referred to as the 'Earth Summit.' Participants in this landmark event had a forward-looking perspective on the financial world and recognized the necessity of a comprehensive economic transformation to support sustainable development. Consequently, they identified the private finance sector as a vital component of the future green economy.

This foundational premise underpinned the establishment of the United Nations Environment Programme Finance Initiative (UNEP FI), marking the commencement of the immediate implementation of this agenda.

The UNEP FI plays an important role in the holistic UN sustainable policy by bringing together more than 500 banks and insurance institutions worldwide in an effort to reshape the financial system. The UNEP FI has set three main goals it strives to achieve:

- Help financial institutions set and implement sustainability targets;
- Implement global frameworks developed by leading practitioners;
- In-depth thematic research, guidance and communities of practice (United Nations Environment Programme Finance Initiative, official web-page, 2024).

For achieving these aims, UNEP FI has established a certain methodology with a set of guiding tools known as UNEP FI's Principles for Responsible Banking and Principles for Sustainable Insurance. These principles were elaborated during the 30-year history of UNEP FI's functioning and represent its core stands in sustainable development which the organization tries to incorporate into the global economic system. These principles are:

- Principles for Responsible Banking (PRB): these rules are aimed at embedding SDG and the Paris Climate Agreement key points into banking practice*;*
- Principles for Sustainable Insurance (PSI): these principles represent a framework on how to introduce ESG risks in non-life and life & health insurance practice;
- Principles for Responsible Investment (PRI): in collaboration with the Investment Leadership Programme, the UNEP FI attempts to raise investment awareness about their responsibility to use their market power for sustainability development promotion (UNEP Finance Initiative (UNEP FI) – Junior Communications Consultant, Nature and Climate, 2024).

The financial market stands as one of the cornerstones of a capitalist economy, ensuring its proper functioning by facilitating resource allocation, providing liquidity for businesses, and supporting development through investment activities. Consequently, it plays a significant role in bolstering the green transition and sustainable development.

In this context, two key concepts emerged. The first is 'financing for sustainable development,' which pertains to the search for resources to fund programs aimed at achieving the SDG, with a primary emphasis on budgetary resources. It also encompasses the modernization of public policies to broaden the avenues for financing sustainable development. The second concept is 'sustainable finance,' primarily focusing on socially responsible private investments, the formulation of their characteristics and principles, the incorporation of these principles into the regulatory framework, and the practices of financial markets (United Nations, Sustainable Development, official web-page, 2024).

The latter notion has evolved into a distinct field within political and economic studies due to its fundamental and independent nature. Among the various definitions of sustainable finance, two simplest options appear to be the most precise. The first definition, formulated by International Monetary Fund (IMF) experts, defines sustainable finance as the integration of ESG principles into the decision-making processes of businesses, encompassing operational, strategic, and methodological decisions in the realm of investment strategies. This integration aims to generate positive externalities for all stakeholders (IMF, 2019).

The second definition, proposed by D. Schoenmaker, characterizes sustainable finance as an exploration of how finance interacts with the economy and contributes to resolving social and environmental issues (Schoenmaker, 2017). In his work, he discusses how sustainable finance can help to balance the trade-off between economic, social, and environmental issues by supporting the investment allocation procedure to redirect cash flows to sustainably-oriented projects. Moreover, Schoenmaker also points out the power of investors to influence the market. In the majority of cases, investors can indirectly facilitate companies' orientation towards a sustainability development path by stating specific requirements for acquiring their funds. Such influence can be a powerful trigger for entities to reconsider their development strategy if they wish to remain profitable and eligible for receiving funds.

The latter point illustrates the modern state of sustainable finance development. For example, 15 years ago, there were just simple theoretical propositions and some political debates about the incorporation of sustainability concepts into the real economic system, while today we see that companies face a new reality. The majority of banks and different investment organizations, among usual requirements for firms, have introduced a new set of requisites for being eligible to receive financing – sustainability criteria. For instance, how green are the activities of a company, how many funds are planned to be allocated to sustainability issues, certain policy measures undertaken in an enterprise to contribute to combating climate changes, and some others.

Also, intertwining to trace sustainable finance history, take the example of climate bonds. The first idea of issuing financial instruments oriented towards attracting money for climate initiatives was proposed in the 2000s, while in 2016, the total volume of climate bonds trading on international financial markets reached a level of 160 billion US dollars, and in 2019, it surpassed the point of 250 billion. Thereby, today, firms have to be well-educated in the field of financial market 'green' operations to be modern, to develop, and to remain profitable.

In summary, regardless of the specific definition, the financial sector wields significant influence over sustainable development, serving as the primary source of funding for research, technological innovation, business reorientation, and the transition to green principles.

As such, the primary conduit for managing the entire field of sustainable finance is the green financial market, which has now become an integral part of our economic landscape. Much like conventional financial markets, the green financial market offers a range of financial instruments. Most notably, these include green and social bonds, which make up the majority of the derivatives issued under green benchmarks. Additionally, there are 'sustainable' Exchange-traded fund (ETFs) (representing shares of ESG-compliant investment funds traded on stock exchanges), shares of corporations that adhere to ESG principles, and 'sustainable' bonds that facilitate the simultaneous financing of environmental and social projects.

However, it is essential to note that green bonds constitute the largest share of all instruments traded within the green market. Green bonds are debt securities issued with the purpose of raising funds for projects dedicated to environmental protection and improvement. Governments and companies issuing green bonds stand to gain various advantages, including bolstering their image, attracting new investors, and securing resources for ecological projects on favorable terms (Jankovic et al., 2022). According to the Climate Bonds Initiative's Market Intelligence, in 2021, the growth of the green bond market persisted, drawing in over half a trillion US dollars. This statistic underscores the mounting global concern regarding the green transition and the adoption of sustainability frameworks (Elsayed et al., 2022; Sitara et al., 2022).

2.3 Green economy and green transition

Starting talk with a holistic concept of sustainability development targeted at the profound change of peoples thinking, every next concept is persuading a narrower aspect of the framework and is aimed at incorporation of a specifically designed tools into a real practice in order to introduce sustainability in all fields of society activities.

Therefore, the next import concept to be consider is green economy which engendered from a simple idea acknowledging that natural resources are finite and as economically rational creatures we have to use them efficiently in order to achieve the maximum satisfaction.

The term green economy was initially coined by prominent British environmental economists in their report titled ‘Blueprint for a Green Economy’, commissioned by the Government of the United Kingdom in 1989 (Pearce et al., 1989). Although the report itself included the phrase green economy, it was not explicitly used in the text, nor in the subsequent three sequential publications by the authors. Nevertheless, this particular report is widely regarded as laying the foundations for a paradigm that would see active development over the next few decades, eventually becoming a central concept in the modern economic framework (United Nations, 2012).

The term green economy resurfaced twenty years later, this time consciously, through the United Nations Environmental Program (UNEP). Although UNEP was established in 1972, it only truly embraced the concept of the new economic paradigm in 2008 when it initiated the Green Economy Initiative. Originally, UNEP's focus was on addressing the Global Financial Crisis (GFC) and the resulting economic downturn. However, during this period, economists began to recognize the potential of the green economy as a means to resolve ongoing problems by reinvigorating the global economic system and anchoring it in a fresh theoretical framework. This was a novel idea that sparked significant economic debates. UNEP proposed a series of 'green stimulus packages,' which were implemented by some countries on a trial basis as an additional measure to address the recession (Atkisson, 2012).

Despite the significant attention and rapid evolution over the past decade, there remains no universally agreed-upon international definition of the green economy. However, the definition provided by the UNEP holds a fundamental position, considering the organization's pivotal role in initiating the global green movement and its substantial contributions to raising public awareness about environmental issues. UNEP's definition is also the most widely cited in relevant scientific literature and even in numerous recent reports from the United Nations Environment Management Group (UNEMG) and the OECD. This definition was initially put forth in the Green Economy Report released by UNEP in November 2011, as part of its Green Economy Initiative established at the United Nations Conference on Sustainable Development, Rio+20, which succeeded the Rio Conference held in 1992 (Atkisson, 2012).

According to the document, a green economy is described as one that enhances human well-being and social equity while significantly mitigating environmental risks and ecological scarcities. In its simplest form, a green economy is characterized by being low-carbon, resource-efficient, and socially inclusive. Within a green economy, economic growth in terms of income and employment is primarily driven by public and private investments that aim to reduce carbon emissions and pollution, improve energy and resource efficiency, and safeguard biodiversity and ecosystem services. These investments require the support and catalyst of targeted public expenditure, policy reforms, and regulatory changes. The development path should prioritize the maintenance, enhancement, and, when necessary, restoration of natural capital, recognizing it as a critical economic asset and a source of public benefits. This focus on natural capital is of particular significance for impoverished communities whose livelihoods and security are closely tied to the natural environment (UNEP, 2011).

Another essential outcome of this report is that it laid the foundation for a more profound integration of green economy concepts into actual economic practices. It achieved this by capturing global attention on the subject, fostering a continuous stream of scientific research dedicated to ESG issues, and establishing partnerships with commercial entities, including notable institutions like Deutsche Bank. Consequently, it is now widely accepted on a global

scale that economics, politicians, scientists, and entrepreneurs must collaborate in addressing pressing global challenges, such as climate change, ozone depletion, tropical deforestation, and resource depletion in the developing world (Gautam & Kavidayal, 2017).

Around the time of the UNEP report, politicians and economists began contemplating how to translate the green economy concept into reality, leading to the development of one of the foundational concepts in this field, known as the green transition (UNEP, 2011). They recognized the need for a profound shift in the fundamental paradigm of the economic system, moving away from a simple focus on profit and increasing well-being at any cost, to one that allows for the achievement of these goals without harming the planet. By that point, a substantial body of scientific research supported this idea (Boulanger, 2008; Kemp & Loorbach, 2006; Geels & Schot, 2010), providing a solid foundation for the emergence of environmental and social movements, as well as focusing international organizations (UNEP, OECD, International Labour Organization (ILO)) to address these issues at the intergovernmental level.

Therefore, the concept of green transition is designed as a comprehensive strategy that encompasses not only theoretical considerations but also concrete practical measures aimed at transforming the driving force of society onto a sustainable path. This approach seeks to combine economic prosperity, development, and environmental preservation to create the most favourable living conditions for humanity (Hatch et al., 2017).

However, returning to The Green Economy Initiative, it was not just a short-term plan to address the GFC; it was a far-sighted blueprint for gradually transforming economic structures and mindsets. This initiative can be viewed as a direct successor to the 'Blueprint for a Green Economy' because some of the authors of the latter document were also involved in crafting the Green Economy Initiative. These authors were tasked with developing a set of policies that had the potential to revolutionize the green economy by combining traditional financial measures with innovative tools for sustainable development, ultimately aiming to combat the crisis while enhancing the sustainability of the global economy. This effort culminated in the publication of the 'Global Green New Deal' (GGND) in 2009 (UNEMG, 2011).

The idea of reorientation of the economy on a green track has been developing very intensively during the last 10 years and has penetrated almost all aspects of modern society life. In this light, the European Green Deal (EGD) can be seen as a significant achievement in the field. Based on years of practice and debates, it represents a concentration of the majority of ideas on measures of implementing sustainability into political, economic, and social fields of our life and proclaims very ambitious goals for the whole European Union (EU).

Approved by the European Commission in 2020, the EGD is created to achieve climate neutrality by 2050 and capitalize on the climate transition to create opportunities for economic and industrial growth. The Deal includes a wide range of policies and subsidies aimed at reducing pollution while increasing research and investment in clean technologies.

One of the pillars of the EGD, which is at the core of the implementation of the initiative, is the Investment Plan, directly based on the European Cohesion Policy and Article 174 of the Treaty on the Functioning of the European Union (TFEU), which allows the launch of co-financing projects with the participation of Member States.

The investment plan contains three directions.

The first direction is to attract at least 1 trillion euros by 2030 in the format of socially responsible (sustainable) public investment. Of this amount, €528 billion will come from the EU's multiannual budget for the period 2021–2027 plus fees from the European emissions trading scheme. In this regard, the Commission hopes that a larger share of climate and environmental action spending in the European budget than ever before will help attract more private capital, for which the European Investment Bank has a key role to play.

The second direction is activation, which means the intention to provide incentives for unlocking and redistributing both public and (especially) private capital investments. The Action Plan to stimulate sustainable financing is being implemented, and regulations on financial reporting standards corresponding to it have been adopted.

The third area is practical support for state and local authorities, as well as initiators of green projects that are justified from the point of view of the Commission in their planning, development, and implementation.

The main instrument of the Investment Plan is the Just Transition Mechanism (JTM). It is designed to provide priority support to areas and industries that will face particularly serious challenges in an accelerated transition to climate neutrality, and has three pillars:

1. A Just Transition Fund;
2. InvestEU;
3. Public Sector Loan Facility (The European Green Deal, 2019).

It is worth paying attention to the fact that for the EU, it was also important via the European Green Deal to reinforce a balance between such general lines as sustainable development, a high level of environmental protection (supported by the principle of environmental integration in Article 11 TFEU 7), ensuring the smooth functioning of the Single Internal Market, economic growth, as well as the fulfilment of social objectives.

Nowadays in the EU, there is a goal to consolidate, initially at the technical and administrative level, a common understanding of sustainable investment in the process of making financial decisions, in which the relationship between economic, market, and non-economic considerations of the supranational executive power in the EU may turn out to be shifted towards greater consideration of sustainability aspects. Such thoughts are suggested, for example, by the important regulation of the European Parliament and the Council. Taxonomy Regulation (Regulation 2020/852) entered into force on 12 July 2020 and marked an important step towards unification of the sustainability vocabulary across the EU. The core aim of this document is to create a common framework for companies in the EU on how to classify their economic activities as environmentally sustainable or not. A certain activity has to fulfill four conditions in order to be classified as environmentally sustainable. They are:

1. Making a substantial contribution to at least one environmental objective;
2. Doing no significant harm to any other environmental objective;
3. Complying with minimum social safeguards (e.g. OECD Guidelines on Multinational Enterprises and the UN Guiding Principles on Business and Human Rights);
4. Complying with the technical screening criteria.

The Taxonomy regulation defines six environmental targets which are mentioned in the list of requirements above:

1. Mitigation of the negative consequences of climate change;
2. Adaptation to climate change;
3. Sustainable use and protection of water and marine resources;
4. Transition to a circular economy;
5. Prevention and control of environmental pollution;
6. Protection and restoration of biodiversity and ecosystems.

By introducing such a complicated mechanism, the EU attempts to facilitate the green transition and increase the volume of sustainable investments by increasing the availability of reliable and verifiable information about sustainability. It is hoped that this motivates enterprises to reorient their production or activities towards sustainable ones and prevents the market from fragmentation. As a result, the EGD is a powerful instrument of green economy development because it contains not only a well-defined theoretical framework but also certain measures and tools (for example, the investment funds scheme) to really support the green transition, at least within the EU.

However, consideration of that issue on a global scale illustrates a less positive image. Despite a decade of rapid development and a growing global concern regarding the green transition, this issue remains in its early stages. Governments around the world have taken various measures to advance this concept, including allocating budget funds for green initiatives, subsidizing eco-friendly projects, and implementing new legislation. These

actions aim to encourage businesses to embrace the green transition, collaborate, and amplify the 'green wave' effect. While the EU has pioneered many of these efforts, its impact is beneficial for Europe but insufficient to extend the influence globally and bring about a worldwide green transition (Costantini & Mazzanti, 2012).

Several reasons contribute to this discrepancy. Firstly, developing countries often view this issue primarily from an ethical perspective and prioritize more conventional economic problems, deferring the green transition until they accumulate sufficient resources. Secondly, many businesses perceive only additional costs and potential economic losses associated with greening their production processes, which deters them from implementing new concepts into practical operations. The final challenge lies in the fact that some current politicians and prominent economists still adhere to outdated paradigms and obsolete mindsets. This represents one of the most formidable obstacles since government establishments must shift their priorities from a profit-driven focus to embrace non-profit values, such as ecology, society, and our collective future (Chouinard et al., 2011).

2.4 Environmental, social and governance (ESG) framework

It is also worth noting another complementary framework introduced by the UN in their 'Who Cares Wins' report in 2004 – the ESG principles. In this document, the term ESG was used for the first time and since its presentation, this term has started to gain its popularity. The breaking through idea of the report was to make an ESG issue an inseparable part of economic analysis and different financial practices such as asset and risk management, investment, and hedging strategies. This framework was developed to facilitate the integration of the sustainability development concept into the policies of countries, activities of companies, and to reorient the market towards being more sustainable. ESG entails a unique approach to data handling and interpretation, guided by the principles of a green mindset (Ting-Ting et al., 2021).

The publication of the ‘Who Cares Wins’ has engendered a new wave of economic theory development, which was accompanied by multiple new publications devoted to the topic. One of the most remarkable reports worth mentioning is the Freshfields report written by employees of the eponymous law company from the United Kingdom (UK). Their work ‘A legal framework for impact: Sustainability impact in investor decision-making’ has explored the issue of fiduciary duty of asset managers with respect to ESG considerations in investment decision making. The report has concluded that ESG information can be considered as a fiduciary duty of asset managers when it affects asset values and that it may be considered even in value-neutral cases based on the consensus beliefs of final beneficiaries. Even though the report was discussing the importance of only environmental and social issues in financial market participants’ decision-making process, it is considered to be an important milestone in the ESG evolvement path because it cleared the way to sustainable investment strategies in the financial industry (Thieu, 2023).

By today the ESG has been shaped due to a surge of interest among the scientific society. The core idea of the concept implies responsibility for the future which means that it is important to:

- Use of natural resources rationally;
- Reduce the risk of destruction of biological species;
- Respect gender equality;
- Fight climate change, poverty and hunger.

The world must develop along a path that will ensure a high standard of living in the present without harming new generations, and in such a context, business plays a big role in the promotion and implementation of that idea. The popularity of ESG investing is growing every year. Experts believe that this is partly due to the interests of millennials (born in the 1980s and 1990s), who have become a solvent audience. The values of this generation differ from the previous one: for them, business and investment are not only about income but also about caring for the environment and society (Sheehan et al., 2023).

Increased demand for ESG is forcing companies to take sustainability into account. Now, due to pressure from investors and banks, it is not profitable for them to have a low ESG rating (Lee & Suh, 2022).

Investors are less supportive of companies with low ESG ratings. In 2020, Ernst & Young conducted a survey among institutional investors – insurance and investment companies, pension and charitable funds. As a result, 98% of respondents said they strictly monitor a company's ESG rating. Possible explanations for such behaviour can be the following:

- The positive relationship between responsible investment and security returns has been confirmed.
- By focusing on ESG ratings, investors can avoid companies whose activities are associated with environmental risks and large monetary losses, such as the oil spill due to the explosion of the Transocean platform in 2010.
- Banks take into account ESG ratings when issuing loans. In these loans, the interest rate is tied to compliance with environmental policy and responsible investment requirements (Fatmi et al., 2018).

However, the implementation of ESG principles can be advantageous for a business also from the Human Resources (HR) perspective. To strengthen the company's image in the labour market, it is necessary to organize management taking into account the principles of social responsibility. The better conditions you provide, the more attractive an employer you will become in the eyes of job seekers. Consequently, you will be able to spend fewer resources on searching and hiring personnel, reduce the risk of losing valuable employees, and decrease staff turnover (Bhattacharya et al., 2008).

Another potential benefit for a company from an ESG-oriented strategy is marketing success. Following trends is a good informational point on which you can build a marketing strategy. Tell your audience how your company contributes to the future of the planet. Offer customers new products and services that comply with the principles of responsible consumption, and customers will comprehend a firm as a sustainable one, as one that cares about the planet and society's prosperity, as one that shares the same values as they do. The result of such positioning in the market is increased loyalty among advanced audiences and the attraction of new customers (Albuquerque et al., 2015; Ramlugun & Raboute, 2015).

In conclusion, the ESG concept is a set of rules and approaches to managing a business that contribute to its sustainable development. The principles include concern for the environment, responsible treatment of employees and customers, transparent company operations, and participation in charitable initiatives. A company's commitment to ESG principles provides advantages such as government subsidies, special lending conditions, customer loyalty, attractiveness to employees, and the ability to pay fewer taxes. Compliance with the criteria is monitored through company reports and ESG ratings from independent agencies. Each organization has the right to independently determine the vector of development and implementation of ESG principles in its strategy. As a rule, it is necessary to determine priority areas, assign responsibility, allocate resources, and establish measurable and realistic Key Performance Indicators (KPIs).

3 SUSTAINABILITY IMPACTS

3.1 Positive impacts

3.1.1 E-environmental positive impacts

On the microeconomic level, businesses can derive various advantages from the green transition. For instance, expanding their product line to include eco-friendly products can result in increased profits, even if the prices are higher. Today's market exhibits a demand for eco-products, and consumers are willing to pay a premium for them. Additional potential benefits include improved product quality, enhanced energy efficiency in manufacturing processes, and more. All of these factors contribute to increased business profits, leading to higher tax revenues and a higher GDP of the country (Ambec, 2017).

Some of the benefits are sector-specific. Implementing policies in the energy sector will promote the development of renewable energy generation, supply, and storage. This could ensure a country's energy independence and security, a pressing concern in today's world. It may also significantly reduce the contribution of energy sources to price increases and serve as an additional measure to mitigate inflation risks. Furthermore, incorporating the

requirements for both private and public transport into energy legislative frameworks will bolster a nation's overall position (Standal et al., 2023).

For example, the EU has adopted a prohibition on the sale of new internal combustion engine cars (gasoline and diesel cars) in all Member States starting in 2035. As global analysts have widely acknowledged, this measure will accelerate the transition to electric vehicles, combat climate change by compelling companies to invest in new production technologies, and develop new electric vehicle components. It will also necessitate the reorganization and renovation of existing manufacturing facilities. These processes set off a comprehensive chain reaction throughout the economy, including the recruitment of new personnel, increased investments in research, and a surge in orders for construction companies. This, in turn, creates a profound and extensive economic transformation akin to the past industrial revolutions. Consequently, the deep transformation of the economy will stimulate its growth and elevate overall prosperity (Horn, 2024). As this is a long-term process, the country stands to reap benefits at various stages over an extended period.

Countries benefit from the green transition at a broader level by enhancing their global reputation. This, in turn, improves their competitiveness in financial markets. New-generation investors are increasingly concerned not only about profit but also about the impact of their investments on ESG issues (Bauer et al., 2020; Brodback et al., 2019). Today's world is transitioning from a self-centred paradigm of the past century to a socially responsible behavioural model. Therefore, a country's positive image as an environmental steward, socially responsible entity, and a reliable actor in the governmental sector could elevate its status as a driver of investment attractiveness.

Until now, the discussion has primarily focused on the E-environmental aspect of the ESG framework. This emphasis on the environmental component is a logical starting point because of the pressing need to address the rapidly worsening climate crisis. Consequently, there has been a greater allocation of interest and financial resources to the E-environmental component, while the S-social and G-governance aspects have received comparatively less attention. However, this one-sided orientation may have potentially detrimental effects on the two other areas. For instance, in the pursuit of expanding renewable energy production, large solar panel farms have been built in developing countries where land property rights are not well-established and protected. As a result, these solar panel farms may encroach on the territories of indigenous tribes, disrupting their ecosystems and societies, leading to their gradual decline (Schrieberg, 2023). This example illustrates that all three components of ESG are closely intertwined with each other, and it is impossible to consider them separately or prioritize only one. However, as the E-environmental component has already been scrutinized, it is now worth clarifying the S-social and G-governance parts.

3.1.2 S-social positive impacts

In theory, it is possible to trace the S-social component back to the time of the industrial revolution when employees began to advocate for their social rights. During that era, people started to become more aware of what proper working conditions should be, how employers ought to treat them, and what constitutes lawful and humane business practices. Labour unions were the first attempts to organize this field, providing people with decent working conditions and ensuring the protection of their rights and interests (UN, 2004).

Today, our society has progressed significantly from the exploitation of people in the 18th and 19th centuries to a relatively high level of working standards. These standards are not only supported by labour unions but also at the state level through a system of laws, such as the Labour Code. Furthermore, workers enjoy greater protection through state-guaranteed minimum wage levels (Guangzhong et al., 2020).

However, it is essential to note that the S-social component of ESG encompasses more than just labour-related aspects. Social criteria encompass attitudes toward employees, customers, partners, and society as a whole. This includes not only labour protection and professional development of employees but also responsibilities to customers, product safety, efforts to combat poverty and social inequality, to promote inclusiveness, and more.

Each element included in the S-social part of ESG has a substantial impact on a company's financial performance and the broader economic system, both in the short and long term. The quality of working conditions significantly affect the productivity of employees. Moreover, it can help prevent social unrest, strikes, and disruptions in normal business operations. A case in point is the famous United States of America (USA) postal strike in 1970 when letter carriers just stopped working and for a protest with demand to rise their salary and provide with less damaging working conditions. This strike led to an announcement of a national emergency due to the disruption of a delivery of millions postal package which affect communication between administrative institutions, political offices, business partners and ordinary citizens. Such disastrous events can significantly affect a lot of industries such as cargo shipping, vehicle logistics and factories productions processes due to disruption of resources supply, tourism, air travel schedules and a lot of others. Such supply chain interruptions can result in substantial financial losses and heightened risks for businesses (Fernandez et al., 2023).

In this regard, another substantial risk for a business is its reputation, which hinges on how it treats its employees and the quality of its products or services. Companies must be accountable for the products they sell in the market because in two ways: by ensuring customer safety and by upholding the firm's reputation as a responsible producer. Adhering to such accountability principles can help reduce expenses related to replacing low-quality products or the costs of repairing damage to the company's reputation. For instance, consider

the Ernst&Young scandal involving their audit of Wirecard. As a consequence, Ernst & Young has been prohibited from serving other clients in Germany for the next three years, implying a considerable loss of reputation and long-term profit (Reuters, 2023).

The last, but certainly not the least, issue within the S-social component is the fight against poverty and social inequality. This matter is closely intertwined with all the aspects mentioned earlier, making it a complex and comprehensive challenge. On one hand, addressing poverty and inequality directly impacts the demographic situation by ensuring people have decent living conditions, adequate salaries, and social safety nets. This encompasses the provision of healthcare, education, and various social services equally to all citizens. At the same time, social equality contributes to a decrease in crime rates, which is a crucial factor in improving overall living conditions. When you consider all of these factors collectively, it becomes apparent that the S-social part of ESG utilizes them as a mechanism for indirectly influencing the expansion of the workforce, increasing the purchasing power of consumers, and expanding the customer base (S&P, 2020).

In this context, it is evident why the S-social aspect of ESG policies has gained greater importance for investors than ever before. This shift is reflected in various initiatives from financial market participants. For instance, in the summer of 2019, approximately 200 chief executives (Standard and Poor's (S&P) Global's own Chief Executive Officer (CEO)) signed a document where they declared that the purpose of a business should not prioritize only shareholder value. Instead, they emphasized the importance of placing people (both employees and customers) at the forefront and highlighted the role of communities as an environment where businesses should invest their time, resources, and effort to foster study, work, and professional growth, ultimately ensuring the long-term growth and success of a business (Perrone, 2020).

These examples reveal that awareness among governments, the business community, and customers about the importance of the S-social component is growing significantly. The social component wields significant influence on the development direction of our society.

3.1.3 G-governance positive impacts

Turning to the G-governance aspect, it represents the corporate governance system, the evaluation of managerial activities based on key performance indicators related to long-term goals and ESG risks, as well as transparency of a country or company and the quality of information disclosure (Baker, 2021).

The importance of the G-governance aspect has garnered significant attention in the past decade and has been studied from various perspectives within the economic community. Research by Lopez-de-Silanes et al. (2019) demonstrated that companies with higher ESG scores tend to have better-quality corporate disclosure. El Ghoul et al. in 2011 added to this

finding by showing that higher ESG scores are also indicative of lower information asymmetry. They further found that companies going public through Initial Public Offer (IPO) would experience lower underpricing if they are from countries with a higher score for the G-governance part of ESG. In contrast, firms from countries with a less developed governance aspect of their ESG policy tend to have lower first-day returns during IPO (Da et al., 2011; Liu et al., 2014).

These findings are based on various aspects of the G-governance element within the ESG framework. The governance aspect includes transparent payment schemes and tax payments to ensure the absence of bribery and corruption practices, lobbying and donation policies, the hierarchy and promotion mechanism within a company, diversity within the executive board in terms of gender and race, their level of education, values and ethics of management, and the allocation of internal responsibilities (Haixu et al., 2023). It highlights the importance of governance practices that promote transparency, ethical behaviour, and accountability.

Indeed, the G-governance component of the ESG framework has become increasingly important for all financial market participants, including potential investors, partners, banks, and customers. Maintaining a high level of governance practices is a key mechanism for lowering risks and promoting transparency and ethical behaviour. It has a direct impact on a company's reputation, which, in turn, influences various aspects of its business operations. Companies with a strong G-governance component can benefit from better credit conditions, successful negotiations with partners, the acquisition of new customers, an increase in market share, and more. Numerous contemporary studies have shown that the G-governance component significantly affects a firm's market value (Firk et al., 2016; Sheikh, 2018; Firk et al., 2019).

The continued importance of the G-governance aspect in the ESG framework over the next decade is widely acknowledged by experts and analysts, including those at S&P. Companies and government entities will increasingly need to strengthen their governance policies to operate successfully on the international financial stage. This is because the elements within the ESG framework are closely interconnected, and improvements in one area can contribute to the strength of others. Given the urgency and necessity of green transition policies today, the transparency and proactiveness of governance in this area will also have a direct impact on Government Ratings, whether for a country or a company. Consequently, these factors will affect their financial standing and overall economic success.

3.2 Negative impacts

While the implementation of sustainable development ideas and the incorporation of ESG concepts into various aspects of human activity represent a significant leap in the evolution of our society, like with any newly introduced concept, they also come with their

disadvantages. In addition to the numerous advantages for the present and future, sustainability also brings about a multitude of problems that our society has already encountered and potential threats that it is yet to face.

3.2.1 E-environmental negative impacts

One of the primary objectives of the E-environmental component of sustainable development is to prevent the depletion of the Earth's natural resources and safeguard the environment from the various forms of pollution and destruction of wildlife habitats (Yousefi et al., 2023). Addressing these challenges requires a profound transformation of the entire production process, which is only feasible through a simultaneous shift towards conscious consumption and the adoption of products that are not only environmentally sustainable but also produced in a sustainable manner. Unfortunately, the latter aspect often receives insufficient attention, making it one of the most problematic and weakest points in the sustainability transition (Wang et al., 2023).

As pointed out by several researchers (Milev et al., 2021; Vitto, 2021; Albrechtowicy, 2023), the current method of Electric Vehicle (EV) production generates more pollution for our environment than the manufacturing of conventional ICE vehicles. The most concerning aspect of this process is the assembly of batteries, which accounts for approximately 91.9% of the total Carbon Dioxide (CO2) emissions in this procedure. Additionally, a significant challenge to be addressed is the proper disposal of batteries at the end of their useful life. Recycling these essential components of EVs is a highly complex process due to their chemical composition, which, without appropriate treatment, can become a new source of soil and water contamination. Furthermore, the widespread use of EVs results in increased energy consumption for charging, and the charging of EVs can lead to higher emissions of polluting gases compared to ICE vehicles, primarily because a substantial portion of energy production today is not derived from renewable sources.

The implementation of Battery Electric Vehicle (BEV) technology also has implications for land use and its subsequent impact on the carbon cycle. Compared to the production of biofuels, BEVs require significantly less land (Campbell et al., 2009). However, it is important to note that less land use does not mean there is no environmental impact. The transition from internal combustion engine (ICE) to BEV production is a complex process that often involves expanding existing facilities and constructing new ones. While this creates a need for additional land for building facilities, it also leads to a reduction in cultivated areas, resulting in a smaller volume of harvests and potential food supply shortages. Moreover, the increased demand for land can contribute to deforestation and disrupt the carbon cycle (Schmidt et al., 2011). Another significant aspect to consider is the potential threat to local communities living in areas targeted for production expansion. Many large plants are located in third-world countries where small indigenous groups still exist. These communities are highly dependent on their environment and may face the risk of

extinction due to the destruction of their natural habitat. However, this argument intersects with the S-social component of the ESG framework (Kennedy et al., 2023).

Indeed, the entire life cycle of EVs, particularly the battery component, requires substantial improvements in terms of advancing production technologies and practices. This includes transitioning to more sustainable sources of energy for charging, implementing stricter rules for recycling, and enhancing control procedures. A holistic approach is necessary to ensure that the benefits of EV use do not become outweighed by the negative impacts associated with their manufacturing and servicing.

While the example of EV production is one of the most well-known, such problems appear in a great number of industries. Another example is alternative packaging manufacturing. While transitioning to more sustainable products, such as alternative packaging to replace conventional plastics, can lead to a reduction in plastic use and the associated harm of plastic production and recycling, it is essential to consider that the production of these alternatives can also pose environmental challenges. As highlighted in a study by Turkcu and Tura (2023), these potential benefits must be carefully weighed against the potential ESG issues arising from the production of sustainable alternatives.

All such examples are closely linked to another quite common issue – greenwashing. This term is used in relation to unscrupulous producers who use the eco-agenda to deceive consumers. Such companies start new marketing strategies aimed at enhancing the image of a firm as a sustainable business and promoting new ecologically-friendly products, while in reality, neither the business strategy, production process, nor the final product has anything to do with being ‘green’ or sustainable. Greenwashing Public Relations (PR) strategies exaggerate the contribution of products or services to sustainable development. Instead, it attracts public attention by deceiving customers (Lyon & Montgomery, 2015; Crilly et al., 2016). According to a study conducted by TerraChoice in 2009, 98% of all ‘green’ products presented in USA stores turned out to be ‘fake green’ (Packaging Digest, 2014). Unfortunately, the situation has not changed much in recent years. McKinsey & Company in 2019 stated that only 1% of products on the fashion market received the well-deserved status of sustainable (Luxury Society, 2014).

All this is done with one goal: to declare a business as a sustainable one, improve its reputation, and attract new consumers with a commitment to protect the planet. And, of course, benefit financially from this. According to a study by the Competition and Markets Authority (CMA), 60% of consumers are willing to pay more for the opportunity to purchase environmentally friendly products. McKinsey & Company experts note that in just 3 years, the number of search queries containing the phrase ‘sustainable fashion’ has tripled. The popularity of the corresponding hashtag on social networks has increased fivefold (Blazkova et al., 2023). In such situation fashion brands could not help but respond to audience requests: in 2019, the number of eco-friendly products in new collections increased by 400%.

And the point here is not at all that companies care about the environment: the modern eco-agenda in brand development strategy has less and less to do with reality and more and more to do with marketing tools.

3.2.2 S-social negative impacts

Reducing unemployment is a key goal of the S-social component in sustainable development. While sustainable business models are often expected to create more job opportunities, the reality is more complex. Transitioning to sustainable practices typically involves changing production technologies, which can create demand for employees with new skills and knowledge, leading to the creation of new types of jobs and workplaces (Liu et al., 2023). However, this technological shift doesn't happen overnight, and the establishment of new sustainable production processes can be time-consuming. Meanwhile, the elimination of 'non-green' business activities is already occurring due to various legal requirements from governments (e.g., the EGD). This gap in technological development, resulting from the time it takes to transition, can lead to a temporary increase in unemployment. Moreover, this gap tends to be more pronounced in developing countries, where the implementation and development of new manufacturing approaches take longer, thereby prolonging the unemployment crisis (Binz et al., 2016; Trippl et al., 2020).

Sulich et al. (2020) conducted a study in which they asserted that the promotion of green transition is beneficial for the younger generation, making it easier for them to find their first employment. However, their research also found that the older generation faces more challenges than opportunities during this transition. This discrepancy can be explained by the fact that the younger generation was born, raised, and educated in a new technological and economic environment, which doesn't require them to be re-educated, change their job profiles, acquire new knowledge and skills. In contrast, older individuals need to invest a significant amount of time, money, and effort to adapt to the new economic reality.

One of the next challenges a business will face on its journey toward sustainability is maintaining overall competitiveness and profitability. Several studies have shown that, in general, the promotion of sustainability goals positively affects a company's competitiveness (Agan et al., 2013; Cantele & Zardini, 2018). However, this conclusion is not straightforward and comes with certain implicit conditions, one of which is that companies need time to properly integrate a sustainability mindset into their business ethics. For example, in 2023, the European Commission adopted the Corporate Sustainability Reporting Directive (CSRD), requiring mostly large companies in the EU to report on their sustainability efforts in 2024. This means that enterprises will need to make significant unexpected investments, including implementing new data gathering and processing systems, training existing employees or hiring new ones with the necessary skills, and potentially seeking assistance from external consulting firms to prepare proper sustainability reports.

These issues can pose a risk to companies' competitiveness in two ways. Firstly, they entail significant unforeseen investments. The second potential risk is the disruption of business reputation if a company fails to demonstrate a high level of sustainability orientation in its activities. In both cases, it is essential to strike a balance between sustainability and business interests to ensure that sustainability policies positively impact a company's competitiveness and performance without undermining its profitability and overall value (Kautonen et al., 2020).

The same logic can be applied to the competitiveness analysis of a particular country. The EU is globally recognized as a pioneer in the field of green transition and the promotion of sustainable development. However, even within the EU, there are countries that are economically stronger and can afford greater investments envisaged by the Green Agenda. Consequently, they are likely to develop more rapidly in this field. This economic inequality is not limited to the EU; it extends to the global arena where the EU surpasses a majority of countries (Almeida et al., 2023). For example, the EU has become the first institution that, on the level of all its members, has approved obligatory sustainability reporting. In the USA or China, on the contrary, such disclosures are voluntary. Besides, the EU has set almost the earliest date of the official suspension of the production of combustion engines (2035) in comparison with other countries, with an exception of the former EU member – Britain, and Singapore who set 2030. Another important aspect is the world rating of the most sustainable stock markets. According to the research of the Morningstar Sustainability Atlas (Baselli, 2021), only EU member countries were competing for the top three spots: the Netherlands, France, Sweden, and Finland on the third place. The closest non-EU country was Hong Kong in the fourth place.

Such economic disparities can lead to unequal sustainable development, causing some countries to be at a disadvantage in terms of attracting investor funds, gaining the interest of major companies for product supply, or creating new employment opportunities by establishing production facilities within their borders.

3.2.3 G-governance negative impacts

To continue the discussion on the competitiveness issue, it is worth noting that it is still possible to manage it, even though it is a challenging task. This challenge is closely related to the G-governance aspect of the sustainability policy. As mentioned earlier when discussing the environmental drawbacks of the green transition, it is important to address the question of overall management strategy.

The implementation of sustainable governance principles inevitably leads to conflicts within a company or a country because there will always be a tendency to give more attention to one aspect of the comprehensive ESG approach. Moreover, disparities between various goals set within a sustainability strategy will grow over time and vary based on spatial

circumstances. The consequences of such conflicts can significantly damage economic performance, disrupt internal business processes, erode competitive advantages, and ultimately result in market position loss or even place a company at risk of complete economic failure (Hahn et al., 2015).

These problems exist within individual companies and among firms in the same economic sector. However, the issue is also relevant when describing the challenges faced by the government of a particular country, as it can explain the situation on the global political and economic stage. At the international level, conflicts of interest between states could lead to a misalignment of sustainability goals among countries. This, in turn, would hinder international cooperation in addressing environmental crises, reduce the effectiveness of individual efforts, and pose a significant risk to humanity as a whole (Thmson Reuters, 2023).

Despite the different levels of problem consideration, the measures that can be undertaken are quite similar. First, it is essential to reconcile the general management strategy and develop a balanced approach tailored to the specific circumstances of a particular company or country. Second, one of the most commonly used practices for resolving such conflicts is to form an alliance or association with a single set of rules, management principles, and controlling practices. This can ensure a unified approach to sustainable development, provide common ground for successful global collaboration, and offer hope for achieving sustainability goals (Tura et al., 2019).

To conclude debates about the challenges humanity faces on its sustainable development path, it is important to consider one last point, which, nevertheless, should be among the first due to its importance. The green transition will lead to a significant quantitative upgrade of the current system, boosting economic growth all over the world. However, these are consequences, and there is one important precondition – initial investments. Today, approximate estimations of the amount of money required for sustainable development programs vary significantly, ranging from 100 trillion to 300 trillion USA dollars between now and 2050 (Barclays, 2023). There is a significant gap between available international financing and sustainable development financing needs, especially in developing countries (Almassy & Pulawska, 2015; Alpino et al., 2023). Therefore in such a situation countries with a restricted available amount of finance would have to resolve this problem by means of the external loans which in turns means greater pressure on states budgets, put it in a harsher economic circumstances and can finally put their creditworthiness under a threat.

It is presumed that the main part of these substantial investments will come from the private sector, which is the core question of this issue. Private investors are unwilling to put considerable amounts of money into long-term projects, especially with a quite obscure prediction about future profitability – when, how much, etc. On the state side, there is also a significant scarcity of budget money that could be allocated to green transition. This complex

issue is becoming more complicated due to additional burdens put on countries by the current energy crisis and rising inflation. All these factors place the challenges of financing sustainability in the second position (Bloomberg Intelligence, 2022). In the present situation, the only effective way would be the collaboration between governments, businesses, and private investors to elaborate a cautious yet fruitful strategy of gradual money accumulation and their wise allocation to the most urgent issues.

In the EU, there have already been some steps taken toward that aim. The current president of the European Commission, Ursula Von der Leyen, has initiated debates about simplifying existing state aid rules, which are quite complicated in the EU. However, there is still a lot to be done ahead of us to make funding mechanisms and regulations more manageable for businesses because only a clear understanding of such procedures can make private investors more inclined to participate in the green transition (Hollinger, 2022).

4 STANDARD DETERMINANTS OF THE SOVEREIGN CREDIT RATINGS

In the era of globalization, a country's investment attractiveness is considered one of the most critical and powerful drivers of its economic advancement. However, the modern international foreign investment market is highly competitive, with recipient countries trying fiercely to attract foreign capital to their national economies. This competition is not limited to developing countries or those with transitioning economies; even economically developed states are actively participating (Chen et al., 2016; Jantoń-Drozdowska & Majewska, 2016).

Therefore, it is crucial for a contemporary country to enhance its position and boost its competitiveness as a recipient country in the international capital market. Governments worldwide are striving to enhance their legislation and economic policies, foster a favourable investment environment, and attract investors (Marchewka, 2022). In this context, the question of how to measure a country's investment attractiveness and whether a unified metric can be found for comparative purposes is not a simple and straightforward one. In practice, the metric attempting to encompass these issues is SCR.

A sovereign credit rating is a specialized assessment conducted by internationally renowned Credit Rating Agencies (CRA), including Standard & Poor's, Moody's, and Fitch (the largest and most reliable ones). Their evaluations provide a quantifiable measure of a country's creditworthiness, indicating the ability and willingness of a specific sovereign country to meet its obligations to creditors or the likelihood of such an outcome. Therefore, SCR directly evaluate a country's investment attractiveness (Athari et al., 2021).

Nowadays, there are 117 active credit rating agencies registered worldwide; however, only several of them are well-known globally due to the reputation they have gained during their

long history of work. The question of trustworthy assessment became even more relevant after the financial crisis in 2007-2008. This is because Credit Rating Agencies (CRAs) were accused of providing faulty high credit assessments of firms and mortgage-backed securities (MBSs). CRAs themselves gained profit from artificially high ratings, inflating market shares' value. This led to bad investment decisions and a catastrophic fall in the mortgage sector, culminating in a financial crisis (Shen & Huang, 2021).

Today, various legislative acts place Credit Rating Agencies (CRAs) under scrutiny, setting prerequisites and demanding adherence to strict rules for them to be allowed to release their assessments to the public. For instance, in the USA, the Securities and Exchange Commission (SEC) is responsible for monitoring the market and protecting it from manipulations (Stolper, 2009). Similarly, in the EU, a special regulatory institution with the authority to directly supervise CRAs was established – the European Securities and Markets Authority (ESMA).

CRAs publish assessments of financial instruments, companies, and countries for financial market participants who need an estimate of the creditworthiness of their potential partners or the issuer of financial securities. These agencies play a crucial role by providing an insightful, objective, and independent assessment on which the public can rely in their decision-making. This is particularly important because public users often lack access to certain commercial data that CRAs have under undisclosed conditions. Therefore, ensuring the reliability of CRA ratings is of utmost importance.

After the 1990s, the so-called Big Three emerged, a group of three prominent Credit Rating Agencies (CRAs) based in the US: Standard & Poor's, Moody's, and Fitch. These agencies cover a broad spectrum of measurements, including Sovereign Credit Ratings (SCR) of countries, credit risk assessments of enterprises, stocks of private companies, various bonds (both private companies and governmental), mortgage-backed securities, credit default swaps, and collateralized debt obligations. Despite their dominance and global recognition, these three CRAs face criticism for operating as an oligopoly, with concerns about the similarity of their assessments (Poon et al., 2009). Moreover, they have been accused of suppressing competition in the market, which does not contribute to a 'healthy' business environment (Hmiden et al., 2024).

Regarding their assessments, these agencies use very similar but slightly different rating scales. The comparison of these scales is presented in Table 1.

Table 1: Comparison of the rating assessments between credit rating agencies

Fitch	**S&P**	**Moody's**
AAA	AAA	Aaa
AA+	AA+	Aa1

To be continued

Table 1: Comparison of the rating assessments between credit rating agencies (cont.)

Fitch	S&P	Moody's
AA	AA	Aa2
AA-	AA-	Aa3
A+	A+	A1
A	A	A2
A-	A-	A3
BBB+	BBB+	Baa1
BBB	BBB	Baa2
BBB-	BBB-	Baa3
BB+	BB+	Ba1
BB	BB	Ba2
BB-	BB-	Ba3
B+	B+	B1
B	B	B2
B-	B-	B3
CCC+	CCC+	Caa1
CCC	CCC	Caa2
CCC-	CCC-	Caa3
CC	CC	Ca
C	C	Ca
D	D	C

Source: own work

Sovereign credit rating of a country frequently used as an indicator of an investment attractiveness of a state thereby it comprises a broad spectrum of factors, and its evaluation is highly subjective. Individual investors often make decisions based on their personal preferences regarding various indicators of a country's economic activity. As a result, numerous qualitative and quantitative methods have been developed to assess the investment climate of a specific country. These methods rely on diverse economic, political, and financial indicators, which are used to assign an investment rating or estimate to a country, region, or city (Roszko-Wójtowicz & Grzelak, 2021; Mottaleb & Kalirajan, 2010).

The three agencies mentioned employ an array of economic, social, and political factors to formulate an overall assessment of a country's creditworthiness. This evaluation, in turn, determines the country's access to international financial markets and the terms on which it can borrow in those markets. In the current highly volatile environment, marked by the aftermath of the COVID crisis and energy issues, the ability to finance public debt through external borrowing in the capital market is of utmost importance for countries recovering from the pandemic's impact and grappling with high inflation due to energy challenges. Consequently, despite each of the three CRAs having publicly available assessment

methodologies, it remains an intriguing and pertinent topic for researchers to explore all the potential drivers of SCR (Tran et al., 2021; Hantzsche, 2022).

The methodology for credit rating assessment procedures applied by Credit Rating Agencies (CRAs) is more or less the same across different agencies, with variations in some subjective analytical aspects (such as political situation assessments) and modelling (differences in data measurement or equations used) (Bonsall et al., 2016).

The credit rating assessment process begins with a client signing a contract with a Credit Rating Agency (CRA) to maintain data confidentiality. S&P, Moody's, and Fitch employ qualitative and quantitative parameters for such assessments. The determinants of sovereign credit ratings (SCR) identified by Cantor and Packer include per capita output, GDP growth, inflation, external debt, level of economic development, and default history (Cantor & Packer, 1996).[1] S&P, Moody's, and Fitch employ intricate methodologies combining qualitative and quantitative parameters for such assessments.

The underlying logic behind the actual effects of these factors on the sovereign credit rating is as follows (Cantor & Packer, 1996; Afonso et al., 2011; Gaillard, 2012; Gartner et al., 2011; Reusens & Croux, 2017; Osobajo & Akintunde, 2019):

- Per capita output: a country's tax base increases with the rise of companies' output and consequently sales volume, subsequently boosting state resources and enhancing the country's ability to meet its obligations;
- GDP growth: the principal mechanism of this determinant influence is the same as with output per capita, but instead of output, the factor contributing to the rise of the tax base is the increasing output. The greater a country's volume of production, the more stable its economy, and consequently, the probability of state not being able to repay its debt it is lower;
- Inflation: price instability is one of the vital and quite important indicators of the overall health of the economy and public finance. A country may face significant solvency problems due to rising and uncontrolled inflation because. Inflation puts the home currency at risk of depreciation, negatively affecting its exchange rate and may even cause an inner recession;
- External debt: an excessive debt burden may disrupt a country's financial capacity to fulfil all its obligations. When debt starts to exceed income, the risk associated with investing in such economies increase significantly. This, in turn, can limit their access to the capital market and may lead to a default situation;

[1] For corporate credit ratings, the methodology comprises six key parts. These include Business, Economic, Financial, Management, Geographical, and Fundamental analyses, aiming to provide a comprehensive evaluation crucial for financial market participants. While the procedure as well as the main factors differ from those for sovereign credit ratings, the underlying logic is similar.

- Level of economic development: this variable is typically measured in terms of income per capita in relation to a certain threshold. It is assumed that after reaching a particular level of welfare, a country becomes more affluent, and, consequently, increasing its ability to repay its loans. That is why developed countries usually have significantly higher SCR than developing ones;
- Default history: a negative history of defaults, including various crisis and economic troubles a country has experienced in the past, can significantly damage its reputation and affect investors' confidence in its future stability and ability to meet its debt obligations.

In addition to the above factors, in the most recent research, the focus has shifted to some new and quite specific determinants of the SCR. For example, there have been several works scrutinizing the effect of tax policies and budget spending (Croce et al., 2012, Bi et al., 2013, Ricco et al., 2016). More relevant in modern times of extreme economic fluctuations are papers devoted to the analysis of the impact of fiscal uncertainty on the state of the economy, and some scientists have proven the deteriorating effect of economic turbulence (Fernández-Villaverde et al., 2015, Julio & Yook, 2012).

Another interesting and unique study was conducted by Sawadogo (2020), who explored the relationship between SCR and fiscal rules in 36 developing countries for the period from 1993 to 2014. Even though he considered only the presence but not the strength of these rules, his conclusion about the positive influence of fiscal rules on credit ratings is quite interesting.

In the light of the recent banking crisis in the EU, it is also interesting to mention the article written by Cavallo, Powell, and Rigobon (2013). They compiled a sample of 32 emerging market economies for the period from 1998 to 2007, totalling 77,760 observations. This unique sample allowed them to investigate the influence of SCR on banks' profitability and capital ratios. As a result, they proved that investors take SCR into account when making their decisions. This study, along with several others (Monfort & Mulder, 2000; Bissoondoyal-Bheenick, 2005; Afonso et al., 2007; Reusens & Croux, 2017), demonstrated that SCR estimates react strictly procyclically to any crisis. Thus, there is a sustainable and strong negative effect of a crisis on SCR assessments.

In light of these findings, it was acknowledged by the scientific economic community that the decline in the Sovereign Credit Ratings (SCR) of the EU countries, as well as the whole Eurozone, observed in late 2012, was a direct consequence of the economic disturbance caused by banking and sovereign debt crises that occurred over a span of six to seven years (approximately from 2007 to 2012) (Baum et al., 2016).

For example, Spain dropped from AAA in 2009 to BBB- in 2012 on the S&P scale (a 9-position downgrade). A similar fall was observed in Italy during the same period, from A to

BBB-. In general, S&P lowered the rating of 17 countries by 2012, including France (from AAA to AA+), Portugal and Cyprus (both received a so-called 'junk-bond' ratings), and others. Similar situations were observed in other parts of the world during different economic fluctuations. Regardless of having developed or developing economic systems, all countries faced acute consequences of the global economic disturbances in forms of financial (banking, debt or currency) or economic crises, resulting in a downward trend in their sovereign credit rating dynamics. These events occurred during the Asian Financial Crisis (1997–1998), Russia Debt Default (1998), Brazilian Crisis (1998–1999 and 2002), Turkey Crisis (2000–2001), Argentina Crisis (2001), and the US Subprime Mortgage Crisis (2007–2008). (Chee et al., 2015).

However, not only crises or significant economic disruptions can cause a change in the SCR. Even a political decision that may not have any immediate effect can lead to a reassessment by credit rating agencies based on the future perspective consequences. For instance, in 2017, Moody's downgraded the UK's credit rating from Aa1 to Aa2 due to concerns about the impact of Brexit on public finances and the economic growth of the United Kingdom. Another example is the positive, sustainable growth of Slovenia's SCR when it officially applied to become a member of the EU in 1996. Fitch increased its assessment based solely on the announcement of the application, from A- to A in 1999. While other credit rating agencies began to raise their ratings in 2000, by 2004, all three agencies had raised their ratings by 4 positions. This situation illustrates how positive expectations regarding future economic growth and political development can influence an SCR.

At this point, it is worth considering the time characteristics of different determinants of SCR. As Afonso et al. (2011) showed, all of the drivers can be separated into two groups. The first group includes metrics that have a short-term effect on the creditworthiness assessment of a state, such as changes in GDP per capita, GDP growth, government debt, and government balance. The second group comprises factors whose impact is more prolonged, and addressing them requires significant measures from the government. These long-term determinants include government effectiveness, external debt, foreign reserves, and default history. This finding is supported by real-world examples, as it often takes countries from 5 to 10 years to recover after a crisis and restore their position in terms of credit rating assessments.

With regard to the analysis of the existing literature provided above, it is possible to conclude that besides the criteria explicitly evaluated by credit rating agencies, there are numerous factors that implicitly affect SCR or have an indirect effect on the overall final score through other channels. Therefore, it is reasonable to assume that the ESG aspects of a country's policy may also become more important in the modern world, given the growing concerns around green transition and sustainable development and especially their connection to countries' future growth potential through technological change. Consequently, these factors

may become new determinants affecting a country's overall creditworthiness and investment attractiveness.

5 RELATIONSHIP BETWEEN ESG AND CREDIT RATINGS IN THE LITERATURE

The literature review presented above has revealed that the core determinants of SCR are well-established, widely accepted, and applicable to economies around the world. However, over the last decade, there have been attempts to identify unconventional determinants that may directly influence credit ratings through CRA's methodologies or indirectly through various channels by impacting a country's economy and, hence creditworthiness. One such unconventional determinant is country level ESG scores.

When looking at the relationship between ESG scores and SCR, a surprisingly unexpected situation can be observed. Despite intense worldwide promotion and integration of the ESG and green economy concepts into real economic practices, there is still very little research, with the exception of one study by Pineaua, Le, and Estran (2022), devoted to the investigation of the relationship between ESG factors and SCR.

The ESG score of a country represents an overall assessment of its level of advancement, the intensity of its activity, and the general effectiveness of its actions in the field of ESG policies. The score is divided into three sub-groups, respectively:

- Environmental score includes the evaluation of carbon emissions, water pollution, preservation and sustainable use of natural resources, energy efficiency, waste management, and raw material sourcing. Social score typically encompasses diversity and inclusivity (with regard to gender and race aspects), the responsible treatment of human rights, adherence to labour standards, and sometimes, the evaluation of customer satisfaction, data security, and the protection of privacy.
- Governance score pertains to issues, such as the level of corruption and autocracy in administrative units, the inclusion of green transition in legislation, self-control procedures, the level of governmental authorities' responsibility, and the transparency of the governing process.

After the individual evaluation of each component, they are weighted according to a particular institution's approach, and the final number represents the overall ESG score of a country.

While direct research on the relationship between a state's ESG score and its SCR is limited, the amount of studies devoted to the scrutiny of the ESG effect on a company is considerable. That is why, nowadays, the scientific society agrees that the ESG promotion in a certain firm positively affects its credit rating (Fiede et al., 2015; Lööf et al., 2021; Suh & Lee, 2022;

Bonacosi et al., 2024). The study of Peneau et al. (2022) complimented that finding with interesting conclusions. They looked deeper into that topic and found out that in developed countries the determinant with the most influence of the credit rating of a firm is a governance aspect of the ESG, while for countries with the developing economy non-ESG factors still have great power for their creditworthiness assessment.

Also there are a lot of articles devoted to the ESG influence on a company's credit rating and its Corporate Social Responsibility (CSR), which is a related concept. For example, Boubaker et al. (2020) examined the interplay between CSR and financial distress risk. They concluded that better CSR performance provides American businesses with better access to capital markets and simultaneously enhances the creditworthiness of companies. Similarly, Hunjra et al. (2021) explored this issue in the context of a developing market economy in Pakistan and found that a firm's performance can be positively affected through the promotion of culture and religiosity as a part of a high-quality CSR culture. There is a wide range of other studies dedicated to this issue, and they confirm that better CSR practices can improve firm performance, enhance the assessment of banks, and increase the liquidity of derivatives (Azmi et al., 2021; Liu et al., 2021; Lu & Abeysekera, 2021; Luo, 2022).

However, due to the growing significance of the sustainability issues on an international level and growing intense on economic and political arenas, number of researches switching form a corporate to a country level has started to grow during last decade. For example, there are some studies related to the impact of SCR and ESG scores on financial markets. For example, Kiesel and Lücke (2019) investigated the influence of SCR on Credit-default swap (CDS) spreads. They found that the effect is relatively moderate in the presence of strong corporate governance, but without such influence, the effect on the CDS spread around the rating announcement date is significant. In a related study, Lööf et al. (2021) suggested that higher ESG scores for stocks contribute to a decrease in downside risk while potentially leading to smaller upside gains. Broadstock et al. (2021) explored this issue in the Chinese market and found that as the portfolio's ESG score increases, its performance metrics become higher compared to portfolios with weak ESG score assessments.

It is worth noting that several studies have examined the effects of individual components within the ESG framework. For instance, Ciocchini et al. (2003) found that government bonds have a smaller risk premium when the estimated level of corruption is relatively low. Crifo et al. (2017) demonstrated a decrease in government bond spreads due to an increase in the overall ESG score of a state, and Capelle-Blancard et al. (2019) added to this by showing a decline in bond yields (with a stronger effect for long-term derivatives) observed in OECD countries for the same reason.

Margaretic and Pouget (2018) found that states implementing effective programs in the areas of natural, human, and financial resources management have more significant resources, increasing their ability to meet debt obligations. Additionally, Jeanneret (2018) examined

the quality of regulatory mechanisms in a country and identified a significant effect on sovereign default risk. In a more recent attempt to examine the relationship between a country's overall ESG score and the spreads of its government bond credit default swaps (CDS), Reznick et al. (2021) demonstrated a negative correlation. This correlation was stronger for developed states compared to the relationship in countries with developing economies and markets.

The literature review provides several fundamental conclusions about the channels or mechanisms through which a country's ESG scores influence its SCR. As sovereign credit rating reflects the state's economic creditworthiness, it is reasonable to expect ESG factors to indirectly enhance it, as they have been proven to drive better business performance, particularly in the finance sector. This assumption is based on the logic demonstrated in the analysis of Becker et al. (2022), who showed that better ESG practices increase the inflow of capital, which, in turn, directly enhances a country's ability to meet its external debt obligations. Additionally, a study by the World Bank conducted by Inderst and Stewart (2018) supports this idea. The researchers found that the primary goal of establishing a sustainable financial sector is to attract more capital into green investments, which implies a more comprehensive integration of ESG principles into all asset classes' management. As a result, market expectations about the profitability of such investments become more positive, leading to overall market growth.

In terms of the duration of the effect, there is currently no academic evidence of the short- or long-term effects of a country's ESG scores. However, based on the study by Afonso et al. (2011) discussed in the previous section, allows to draw some conclusions. When a SCR is affected by ESG factors through current indicators that are inherently volatile (such as bond spreads, risk premiums, yields, and financial risks), the effect is likely to be short-term.

On the other hand, when considering the other group of mechanisms for the transmission of ESG impact – such as capital flows, creditworthiness, and governmental practices – these mechanisms are not expected to lead to an immediate change that can be quickly substituted by a new economic trend or wave. These channels are designed to bring about a gradual and profound change in the underlying general economic logic and the course of economic activity. Therefore, they are expected to influence SCR over the long term and provide a new assessment with greater stability.

In conclusion, it is reasonable to assert that there is a dependence of SCR on a country's ESG score, and this relationship is expected to become stronger over time due to the increasing global focus on the green transition. The ESG score can influence credit rating assessments through various channels, including affecting the risk and/or profitability of investments, increasing capital inflow, and enhancing investor confidence in the creditworthiness of investments.

Overall, it is important to note that the number of academic studies in this area is relatively moderate, and this field of knowledge is still evolving, highlighting the identified gap in research related to ESG factors and SCR.

6 RESEARCH PROBLEM AND HYPOTHESIS

Over the last decade, there has been a significant increase in the number of research studies in the field of green transition and its impact on different aspects of economic activity, driven by the rising interest and relevance of the topic. This trend is primarily based on the growing number of legislative rules introduced by governments worldwide, as well as increased public awareness of the scale of the impending environmental crisis and individual responsibility for the future of humanity. However, there remains a significant lack of fundamental scientific knowledge in the area of ESG. The roughly 20 years of analysis is insufficient to draw substantial conclusions and establish a solid foundation for economic theory or the creation of a new fundamental framework for the world economic system (Garst et al., 2022; Pu et al., 2022).

Most of the existing research on the implications of the green economy has focused on the micro level. There are numerous studies that explore the effects of implementing ESG standards of work, reporting practices, or more sustainable managerial approaches on various firm performance indicators. Some studies have also been dedicated to the impact of the ESG factor on investment decisions, such as how it affects the risk and profitability of specific derivatives or investment projects, and how investors perceive and utilize ESG as an element of investment attractiveness. However, the consideration of ESG policies at the macroeconomic level, specifically their overall impact on a country, its economy, and other aspects of its functioning, has been relatively rare (Aydoğmuş et al., 2022; Gregory, 2022; Mu et al., 2023; Pineau et al., 2022). This situation underscores the relevance of the present study and highlights the existing knowledge gap that this work aims to address.

An important issue that hinders the development of science in the field of sustainable performance assessment is asymmetry of information regarding sustainable activities at both the firm and state levels. In this respect, challenges range from how to measure the sustainability of companies to comparability of such information between enterprises within one industry and across different industries, as well as how measurements for the same company compare across different data providers.

This issue is one of the most problematic aspects of sustainability policy. Numerous initiatives and approaches are being developed to address this problem. The simplest and least favourable option is to rely on entities' own methodologies. Another approach is to follow guidance provided by international professional institutions with worldwide recognized reputations, such as the International Sustainability Standards Board (ISSB) or the Global Reporting Initiative (GRI) (Wilburn & Wilburn, 2020; Arif et al., 2021; Yu &

Luu, 2021). Yet another one is to regulate sustainability reporting. One of the highest levels of such regulated reporting standards is the CSRD established by the EU, which aims to make reporting requirements clearer, stricter, and more detailed. The second purpose of the Directive is to create sustainability reporting framework for large companies from both financial and non-financial sectors (Rant, 2021). This Regulation includes strict reporting standards for companies in the EU and mandates the use of a unified approach to measuring various metrics related to the ESG aspects of business operations.

Despite the EU's efforts to unify sustainability development metrics, this issue is still far from being completely resolved. Firstly, not all companies in the EU are currently obligated to report on their non-financial activities. Secondly, the EU framework is specific to the region, making it challenging to make reliable comparisons with firms from other parts of the world. Thirdly, these frameworks primarily address ESG assessment at the micro-level, focusing on individual firms, while at the governmental level, there is a vast array of techniques for expressing a country's overall ESG policy in numerical terms, with various approaches and private company assessments contributing to the complexity of the issue (Delmas et al., 2013; Eccles & Stroehle, 2018; Jiang et al., 2022).

It is evident that ESG factors are more likely to be considered in countries with higher levels of economic development, as they have the capacity to allocate resources not only to basic economic policies but also to the green economy and transition measures (Reznick et al., 2021; Pineau et al., 2022). However, sustainable development requires a significant amount of funds. Initially, when measures taken are not financially intensive, development is possible with a small investment. After a certain point in development is achieved, further steps require much more considerable funds and investments, posing a complicated issue for all countries regardless of their level of economic development (Alpino et al., 2023).

For example, according to the European Green Deal (EGD), the estimated investment needed to realize the objectives of the EGD is around 1 trillion euros, with the major part promised to be provided from the EU budget and additional contributions from member states (The European Green Deal, 2019). However, many experts have significant doubts that such an ambitious target will be easy to achieve. Moreover, funds provided by members represent an additional burden on their budgets, and many of them already have significant problems with external debt, such as Portugal, Italy, and Greece (Almeida et al., 2023). Therefore, it is possible to assume that after a certain level of sustainable development is achieved, the continuation of this strategy will require greater funds, and countries may have to increase their external debts, which could possibly influence their Sovereign Credit Ratings (SCR).

Credit ratings play a crucial role in guiding the decisions of policymakers in rated countries, influencing their macroeconomic programs and overall policy decisions (Bissoondoyal-Bheenick, 2005). Therefore, given the increasing awareness of green transition initiatives

and their global promotion, it is highly likely that SCR will soon incorporate an ESG component, reflecting the growing importance of sustainability in both business and political leadership. That is why, there are all reasons to expect that in the coming future financing of the sustainable development and green transition will become more important issue for states around the globe and will significantly affect a lot of economic policies decisions.

Based on the literature review presented in the first chapter of this study, a notable gap in the scientific understanding of the impact of a country's ESG score on its sovereign credit rating has been identified. Furthermore, there is a lack of research exploring the nature of the relations between the ESG score and the sovereign credit rating of a country.

As a result, the following hypotheses have been formulated in accordance with the theoretical framework:

Hypothesis 1: The ESG score of a country is positively related to its sovereign credit rating;

Hypothesis 2: There is a quadratic relationship between the ESG score of a country and its sovereign credit rating, so that after a certain point further rise of the ESG score could be associated with a decrease of its SCR.

To conduct this study and address the research goals, a systematic research plan has been developed. The procedure for executing this research is outlined as follows:

1. Data Compilation: the first step involves assembling a relevant sample by gathering data from reliable databases.
2. ESG Indicator Selection: selection of the most suitable ESG score indicator for the countries in the sample and gathering the necessary data.
3. Model Selection: choosing the most appropriate econometric model for estimating the effect of a country's ESG scores on its SCR.
4. Data Analysis: executing calculations and assessing the significance of the ESG factor on a country level in the evaluation of its creditworthiness.
5. Results Evaluation: scrutinizing the results and comparing them with existing studies and real-world business practices. The study aims to identify not only the existence of relations between the ESG score and the SCR but also the nature of this relationships if they can be described with the parabola and if there a saddle point after which direction of influence is changing.

7 DATA AND METHODOLOGY

In this chapter, the attempt to delve into the details of the databases used to compile a representative sample for the study will be represented. The criteria for selecting the econometric model and the specific determinants included in it will also be discussed. The

chapter will outline the procedure for creating and executing the model, as well as present descriptive statistics for the sample used in the study. This section will provide a comprehensive overview of the data sources, model specifications, and initial findings for the research.

7.1 Data sources

The aim of this study is to explore the relationship between a country's ESG score and its creditworthiness, measured by sovereign credit ratings. For this purpose, I constructed a dataset, comprising of 160 countries and spanning the 2017 to 2021 period with available overall ESG scores and SCR. My research covers not only developed but also developing countries, facilitating a comparison between the two groups. Such a comparative analysis may unveil unexpected interrelations.

For the indicator of countries' SCR, the scores provided by the three most reputable rating agencies globally, namely Standard & Poor's, Moody's, and Fitch, were considered. This selection is in line with the common practice in this scientific field (Wüst, 2022; Christopher et al., 2012; Ratha et al., 2011).

As a source of ESG scores, EcoVadis was chosen as a trustworthy and globally recognized rating agency specializing in sustainable development and ESG scoring. The use of the EcoVadis index offers several advantages. Firstly, EcoVadis is a globally recognized company with a strong reputation, which enhances the trustworthiness of its assessments. Secondly, their experts have developed a unified methodology that enables the comparison of countries from various regions of the world, regardless of their level of economic development. This aspect is crucial for the present research as it allows us to test the second hypothesis. Lastly, the EcoVadis scores encompasses all components of the ESG framework and provide a comprehensive reflection of a country's overall performance in terms of sustainable development and green transition.

In addition to collecting data about SCR and ESG scores, it was essential to also gather supplementary characteristics of countries in the sample, to incorporate them as control variables into the research model. This additional data encompassed the following variables: per capita output, GDP growth, inflation, external debt, the level of economic development, and default history (Cantor & Packer, 1996). To gather data for compiling the dataset, I used reputable databases with a globally recognized reputation, including Bloomberg, S&P IQ, Fitch Connect, the International Monetary Fund, and the World Bank were used as a source of information.

7.2 Rating scales

7.2.1 Sovereign credit ratings

The credit ratings assigned by Credit Rating Agencies (CRAs) to sovereign entities are commonly expressed using letters. Consequently, to incorporate these ratings into a regression equation, it was essential to convert these scores into numerical values.

The logic behind sovereign credit rating assessments is straightforward: A, being the first letter in the English alphabet, signifies a higher score than B, just as B indicates a higher score than C. To expand the scale beyond the three basic letters while maintaining readability, CRAs employ slightly different systems. They may add more letters, sometimes incorporating pluses (indicating a more favourable rating with each additional letter or plus), or they may combine letters with numbers (where a higher number corresponds to a better rating with more letters).

Hence, to create a coding system for the research, the same logical framework was applied. It is a straightforward one: the better the sovereign credit rating assessment, the higher the numerical representation it should be assigned. Thereby, a coding system presented in Table 2 was elaborated and then applied.

Table 2: Credit rating agencies assessments coding

Moody's	S&P	Fitch	CODE
Aaa	AAA	AAA	22
Aa1	AA+	AA+	21
Aa2	AA	AA	20
Aa3	AA-	AA-	19
A1	A+	A+	18
A2	A	A	17
A3	A-	A-	16
Baa1	BBB+	BBB+	15
Baa2	BBB	BBB	14
Baa3	BBB-	BBB-	13
Ba1	BB+	BB+	12
Ba2	BB	BB	11
Ba3	BB-	BB-	10
B1	B+	B+	9
B2	B	B	8
B3	B-	B-	7
Caa1	CCC+	CCC+	6
Caa2	CCC	CCC	5

To be continued

Table 2: Credit rating agencies assessments coding (cont.)

Moody's	S&P	Fitch	CODE
Caa3	CCC-	CCC-	4
Ca	CC	CC	3
Ca	C	C	2
C	D	D	1

Source: own work

7.2.2 EcoVadis overall ESG score

Furthermore, it is crucial to delve into how the external private assessment agency calculated the overall ESG score. EcoVadis employs a distinctive measurement methodology, although it does not disclose the complete details of its mathematical model and measurement approaches. Nonetheless, the agency provides important details and general guidance on its approach for better understanding among its clients and the public. EcoVadis provides profiles on over 160 countries. These profiles cover information on risks across four themes: Environment, health & social, human rights and governance. The maximum overall country ESG score is also 100, with a lower score indicating a lower overall level of a state's advancement in the field of green transition and sustainable development. The EcoVadis index includes both developed and developing ones (hence the sample used in this research comprises 160 states).

EcoVadis country assessment was initially created for two stakeholders: investors and policymakers. For investors, the EcoVadis score serves as a tool to navigate the changing environment and obtain a general overview of the ESG scores of states where they may potentially invest. This is crucial as it can significantly impact the risk and profitability of their investment activities. State governments, on the other hand, use this score to assess their investment attractiveness and compare themselves with competitors in the global capital market. Such analysis allows them to identify problem areas in their policy and potential drivers to enhance their investment attractiveness. This perspective is primarily applicable from the standpoint of sustainable development, assuming that the world as a whole is committed to the green transition movement, and economic agents are increasingly analysing their economic environment from an ESG perspective.

7.3 Methodology of analysis of the effect of ESG scores on sovereign credit ratings

7.3.1 Model chosen

To investigate the impact of a country's ESG score on its sovereign credit rating an appropriate econometric method had to be selected. Based on existing research in this field,

I chose the ordinary least squares (OLS) multiple regression method (Afonso, 2003; Canuto et al., 2011; Chee et al., 2015; Teixeira et al., 2018; Hadzi-Vaskov & Ricci, 2019; Michalski & Low, 2021).

The OLS method was applied for several reasons. Firstly, this is one of the most popular methods, frequently employed by scholars worldwide. Secondly, when all linear regression model assumptions are met, the model yields consistent, unbiased and efficient results, which is crucial for ensuring the validity of subsequent analysis and final conclusions. Thirdly, it offers flexibility in finding the most suitable functional form to describe the relationships between dependent and independent variables in the best possible way (accounting for joint effects, nonlinear relationships, etc.). Additionally, given the nature of the research hypotheses, this work does not require the use of complex methodologies. Therefore, a straightforward and conventional approach is suitable for this investigation. Finally, the multiple regression equation allows for the inclusion of a wide range of essential determinants in the model simultaneously. This not only holds academic significance but also has practical implications, for example, in formulating a policy that takes into account ESG scores and seeks to enhance SCR, taking into account standard determinants of countries' creditworthiness.

This study assumed a model, where a country's SCR is the sum of individual effects of its ESG score and other explanatory variables (Cantor & Packer, 1996; Afonso et al., 2011; Gaillard, 2012; Gartner et al., 2011; Reusens & Croux, 2017; Osobajo & Akintunde, 2019):

$$\mathrm{SCR_{it}} = \beta_0 + \beta_1 * \mathrm{ESG_{it}} + \sum_{j=1}^{10} \beta_j * x_{ijt} + \varepsilon_{\mathrm{it}}, \quad (1)$$

where: $\mathrm{SCR_{it}}$ – sovereign credit rating of country i in year t;
$\mathrm{ESG_{it}}$ – EcoVadis overall ESG score of country i in year t;
x_{ijt} – control variables of country i in year t:

- GDP per $\mathrm{capita_{it}}$ – per capita output in US dollars of country i in year t;
- GDP $\mathrm{growth_{it}}$ – real GDP growth of a country i in year t (annual %, constant prices);
- $\mathrm{CPI_{it}}$ – consumer price index identifying inflation in a country i in year t (annual %);
- External $\mathrm{debt_{it}}$ – an external debt as a % of GDP of a country i in year t (annual %);
- $\mathrm{OECD_{it}}$ – dummy variable indicating if a particular country i is a member of OECD and, consequently, considered to be developed one (is 1 in any year t since the year when a country i joined OECD) ;

- $Default_{it}$ – dummy variable indicating if a particular country i had a default in its economic development history (is 1 in any year t since the year when a country i experienced an official default;
- Four dummy variables denoting a year of observation – dummy variables indicating a year of a particular observation (the sample include observations from the year 2017 to 2021 (5 years), however, only four were included at once in order to avoid multicollinearity).

Since in the current research, it was decided to choose three credit rating assessments provided by different credit rating agencies, the model (1) was performed three times for each agency score separately (namely, Standard & Poor's, Moody's, and Fitch).

Additionally, it was decided to build the same model but in a form of a second order polynomial regression to check whether the relationship between SCR and ESG is non-linear. Thus, the following modified model was constructed:

$$SCR_{it} = \beta_0 + \beta_1 * ESG_{it} + \beta_2 * ESG_{it}^2 + \sum_{j=1}^{10} \beta_j * x_{ijt} + \varepsilon_{it}, \quad (2)$$

where: SCR_{it} – sovereign credit rating of country i in year t;

ESG_{it} – EcoVadis overall ESG score of country i in year t;

ESG^2_{it} – square of the EcoVadis overall ESG score of country i in year t;

x_{ijt} – control variables of country i in year t:

- GDP $per\ capita_{it}$ – per capita output in US dollars of country i in year t;
- GDP $growth_{it}$ – real GDP growth of a country i in year t (annual %, constant prices);
- CPI_{it} – consumer price index identifying inflation in a country i in year t (annual %);
- External $debt_{it}$ – an external debt as a % of GDP of a country i in year t (annual %);
- $OECD_{it}$ – dummy variable indicating if a particular country i is a member of OECD and, consequently, considered to be developed one (is 1 in any year t since the year when a country i joined OECD);
- Default – dummy variable indicating if a particular country i had a default in its economic development history (is 1 in any year t since the year when a country i experienced an official default;
- Four dummy variables denoting a year of observation – dummy variables indicating a year of a particular observation (the sample include observations from the year 2017 to 2021 (5 years), however, only four were included at once in order to avoid multicollinearity).

Furthermore, based on existing methodological practices, it was decided to use pooled regression instead of panel data (Perrelli & Mulder, 2001; Hu et al., 2002; Hill et al., 2010; Canuto et al., 2012). This choice was due to the simplicity of the calculation approach. However the choice of this model caused the results of the study to be inconsistency and biased.

The dataset in principle has a panel data structure, warranting the use of the fixed effects estimator. However, both the independent variable and some of the dependant variables show little to no variation with time. This makes the use of the fixed effects estimator (country-fixed effects) impossible, since the within transformation removes any time-invariant variables. To verify this, the attempt of estimating both models with country-fixed effects was made. The models could not be estimated. It is hoped that the inclusion of several country-level control variables in the pooled OLS regression captures most of the cross-country heterogeneity. Nevertheless, the use of pooled OLS on a panel data structure is subject to severe limitations which can lead to biased and inconsistent results

7.3.2 Control variables included

The next step of the analysis involved choosing proper control variables suitable for the aim of this research. This choice was based on similar studies that explore the effect of various determinants on a sovereign credit rating.

The literature review conducted in the first chapter of this work has shown that there is not a great variety of determinants that scholars try to use in order to explain the mechanism of SCR assessment. Despite several attempts to investigate unconventional relationships or to include new variables based on changing economic environmental conditions, research generally adheres to a conventional set of sovereign credit rating drivers, which includes per capita output, GDP growth, inflation, external debt, level of economic development, and default history (Cantor & Packer, 1996; Afonso et al., 2011; Gaillard, 2012; Gartner et al., 2011; Reusens & Croux, 2017; Osobajo & Akintunde, 2019).

The chosen variables will be calculated as described in Table 3:

Table 3: Description of the control variables

Concept	Variable	Units	Expected sign	References
Gross Domestic Product per capita at constant prices	Per capita output	U.S. dollars	+	Cantor & Packer, 1996; Afonso, 2003; Elkhoury, 2007; Afonso et al., 2011; Gaillard, 2012; Reusens & Croux, 2017
Real GDP growth	GDP growth	annual %, constant prices	+	Cantor & Packer, 1996; Afonso, 2003; Elkhoury, 2007; Afonso et al., 2011; Gaillard, 2012; Reusens & Croux, 2017

To be continued

Table 3: Description of the control variables (cont.)

Inflation, end of period consumer prices	Inflation	annual % change	-	Cantor & Packer, 1996; Afonso, 2003; Bissoondoyal-Bheenick et al., 2006; Elkhoury, 2007; Afonso et al., 2011; Gaillard, 2012; Reusens & Croux, 2017
General government gross debt	External debt	annual % of GDP	-	Cantor & Packer, 1996; Afonso, 2003; Elkhoury, 2007; Afonso et al., 2011; Gaillard, 2012; Reusens & Croux, 2017
Dummy variable which indicates if a country is developed or a developing one	Level of economic development – developed/ developing economy	equals to 1 if the country is a member country of the OECD and 0 otherwise	+	Afonso, 2003; Elkhoury, 2007; Afonso et al., 2011; Gaillard, 2012; Reusens & Croux, 2017;
Dummy variable which incites if a country had a default or not	Default history	equals to 1if a country had a default in the past and 0 otherwise	-	Cantor & Packer, 1996; Afonso, 2003; Elkhoury, 2007; Afonso et al., 2011; Gaillard, 2012; Reusens & Croux, 2017
Year of observation – 1 dummy variable for each year of observations	Year of observation	equals to 1 if an observation is dated to a particular year, and 0 otherwise	+/-	

Source: own work

8 EMPIRICAL RESULTS

8.1 Sample description

The first step in conducting the empirical part of this research was to compile a representative sample. My sample covered a time span of 5 years, from 2017 to 2021 and included 160 countries. This timeframe and number of countries was selected because EcoVadis' overall country ESG scores are only available for this period and for this number of countries.

The countries were grouped based on their membership in the OECD, a widely used criterion in economic practice. The sample included countries from various regions around the world, encompassing Africa, the Americas, Asia, and Europe.

The original sample included 800 observations, data about 160 countries spanning 5 years. However, a data omission issue arose due to:

– Specifics of an EcoVadis database: for some countries EcoVadis started to estimate their ESG score only after a certain year;

- Specifics of CRAs assessments: for some countries credit rating agencies did not evaluate their creditworthiness due to some reasons (for example, Iran is under political sanctions and any economic interactions with it are prohibited);
- Specifics of certain countries: for some countries there were no estimation of GDP per capita or economic growth due to their extremely low level of economic advancement and peculiarities of inner country environment.

Due to the reasons mentioned earlier, the initial sample was imbalanced that is why, observations with missing data were excluded from the sample. Consequently, the number of observations for each year varied within the sample (see Table 4), thereby the panel was unbalanced. The total number of observations was 479.

Table 4: Description of the final sample number of observations

	2017	**2018**	**2019**	**2020**	**2021**
Number of observations	97	96	98	96	92

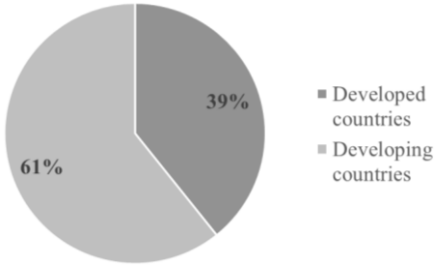
Source: own work

The next step involved checking the sample for statistical outliers using descriptive statistics, Quantile-Quantile graphs, box diagrams, and Cook's distance. These methods assisted in identifying certain observations, which were subsequently examined individually. Based on this examination, decisions were made on whether to retain or exclude them from the sample. After this procedure no statistical outliers were found. So, only observations with missing data were excluded from the initial sample, thus, the final sample still consisted of 479 observations.

The next step in the sample analysis was to examine descriptive statistics.

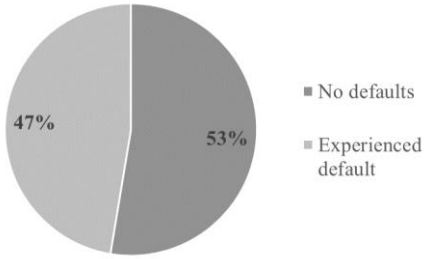
Figure 1 presents the proportion of developed and developing countries in the sample. Considering that, according to OECD data, approximately 78% of countries in the world are developing, the sample created is quite representative, with the number of developed states significantly outnumbered by the developing ones.

Figure 1: Distribution of observation by developed and undeveloped countries



Source: own work

Figure 2: Proportion of countries experienced (or not) a default

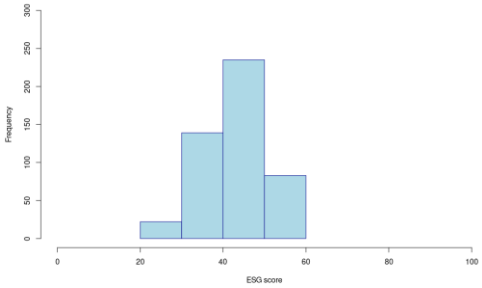


Source: own work

Figure 2 shows that the proportion of countries that experienced default and those that did not is almost equal in the sample.

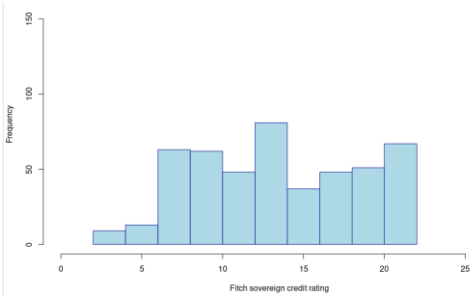
Continuing the sample analysis histograms for variables of the main interest (ESG score and each of CRAs sovereign credit rating assessments) were build, which are presented on Figures 3, 4, 5 and 6.

Figure 3: Frequency histogram for the ESG score



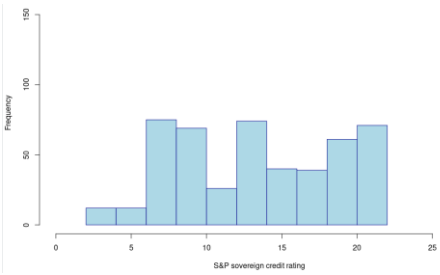
Source: own work

Figure 4: Frequency histogram for the Fitch SCR assessments



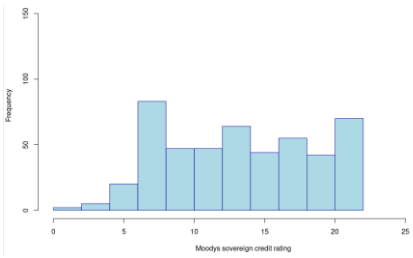
Source: own work

Figure 5: Frequency histogram for the S&P SCR assessments



Source: own work

Figure 6: Frequency histogram for the Moody's SCR assessments



Source: own work

Figure 3 illustrates that the most significant number of observations has an ESG score in the range from 50 to 55, which is still far from the maximum possible of 100. However, in general, the majority of countries have relatively low assessments, indicating that, in real practice, the process of sustainability development is progressing slowly.

As for SCRs, Figures 4, 5, and 6 show a quite similar distribution of observations, which proves once again a common observation that Big Three assessments are quite similar. Only Moody's demonstrates a slightly different pattern with almost the same number of observations with the 9, 10, 11, 15, 18, 19, and 20 scores. Overall, it can be seen that the number of low scores (up to BB or 11 levels) is greater than the top ones (starting from AA or 19 points). That is perfectly aligned with the data from Figure 1 and can be explained by the simple fact that the majority of countries in the sample are developing ones; hence, their SCRs are quite low.

Based on the number of observations in each year (see Table 4), it was found that the year 2019 had the most observations, which is why in order to avoid multicollinearity the dummy variable responsible for the year 2019 was not included into any of regression models constructed.

Table 5 presents the descriptive statistics of the sample used for the regression model.

Table 5: Descriptive statistics

Variable	Mean	Median	Std. Dev.	Min	Max
Fitch	9,05	9	5,19	1	21
S&P	9,1	9	5,36	1	21
Moody's	9,2	9	5,32	1	22
ESG	42,95	44	7,2	20	59,7
GDP per capita	22.290,46	12.590,84	23.525,04	506,82	135.682,79
GDP growth	1,97	2,8	5,05	-30	15,34
CPI	8,91	2,39	47,54	-2,54	595,38
External debt	67,94	55,3	58,72	8,2	518,53

Source: own work

According to the data presented in Table 5, on average, a state has a credit rating assessment of BBB (S&P and Fitch scales) and Baa2 (Moody's scale). This suggests that, on average, a state has a reasonably good level of creditworthiness, though not exceptionally high. The substantial range between the maximum and minimum values indicates heterogeneity in credit ratings across the sample for all three credit rating agencies.

The mean ESG score from EcoVadis is approximately 43, which is relatively low (with 100 being the theoretical maximum, which is never achieved in my sample). However, the substantial difference between the maximum and minimum scores, which is almost 40 points, represents over a 100% increase from the 20-point score level.

In terms of GDP per capita, the average output per person in the sample is approximately 22,290.46 US dollars. Economists have varying opinions on what constitutes a developed economy, with some considering GDP per capita levels of 12,000 to 15,000 US dollars as the threshold, while others raise it to 25,000 to 30,000 US dollars.

In this context, it is possible to consider that, on average, the countries in the sample are developed economies. However, this is a simplified approach, as a country with a relatively high GDP per capita may still belong to the group of developing economies. For example, Qatar has one of the highest GDP per capita levels, reaching approximately 62,000 US dollars in 2021, but it is considered a developing country due to various factors. It is not an OECD member, experiences relatively high levels of inequality, has infrastructure that is not fully developed, and does not provide equal and easy access to higher education to all citizens regardless of their income.

It is also essential to highlight the considerable disparity in GDP per capita values, with Mozambique having the lowest GDP per capita at 506 US dollars, while Luxembourg has the highest at 135.682 US dollars. This significant gap between the developed and developing world is one reason why an average country in the sample has a relatively high average GDP per capita, even though the majority of countries in the database are considered developing economies (see Figure 1). Besides it could be supported by the comparison between the median and mean which demonstrates the difference of 9,700 US dollars. This is a quite difference highlighting that the majority of countries from the sample are less developed than the average.

In terms of GDP growth, it is evident that despite adverse economic conditions in some countries, the global economy managed to grow by an average of 2% each year during the observed 5-year period. This growth rate falls within the range of 2-3% annual growth recommended by the World Bank to achieve a stable and favourable economic environment.

Regarding the Consumer Price Index (CPI) values, it is interesting to note that the minimum level of inflation was -2.5%. This negative inflation was observed in some European countries, which struggled to achieve a positive inflation rate of the target 2% during the same period. On the other hand, there were countries like Venezuela that experienced extreme hyperinflation, reaching as high as 100% inflation per month during critical moments in the past 5-6 years. Consequently, the average inflation rate in the sample is relatively high, around 9%.

A similar pattern can be observed in the case of external debt. The range between the lowest and highest levels of external debt is approximately 500%. This wide variation is attributed to individual country cases, such as Italy and Hong Kong, which have external debt levels of around 150% and 500%, respectively, in comparison to Germany with its 69% external

debt. This significant disparity in external debt levels among countries underscores the diversity in economic conditions and policies across the sample.

Table 6: Correlation matrix

Variable	S&P	Fitch	Moody's	ESG	GDP per capita	GDP growth	CPI	External debt	OECD	Default
S&P	1	0,97***	0,98***	0,56***	0,79***	0,09	-0,24***	0,00	0,62***	-0,46***
Fitch	0,97***	1	0,97***	0,58***	0,79***	0,06**	-0,22***	0,04	0,64***	-0,48***
Moody's	0,98***	0,97***	1	0,55***	0,77***	0,06	-0,23***	-0,01	0,62***	-0,44***
ESG	0,56***	0,58***	0,55***	1	0,55***	-0,004	-0,07	0,08*	0,67***	-0,2***
GDP per capita	0,79***	0,79***	0,77***	0,55***	1	0,014	-0,1**	0,14***	0,6***	-0,45***
GDP growth	0,09	0,06**	0,06	-0,004	0,014	1	-0,14***	-0,22***	0,00	-0,07
CPI	-0,24***	-0,22***	-0,23***	-0,07	-0,1**	-0,14***	1	0,05	-0,11**	0,13***
External debt	0,00	0,04	-0,01	0,08*	0,14***	-0,22***	0,05	1	0,05	-0,06
OECD	0,62***	0,64***	0,62***	0,67***	0,6***	0,00	-0,11**	0,05	1	-0,27***
Default	-0,46***	-0,48***	-0,44***	-0,2***	-0,45***	-0,07	0,13***	-0,6	-0,27***	1

*p<0,1; **p<0,05; ***p<0,01

Source: own work

The correlation matrix presented in Table 6 was created to get a sense of the relationships between the main variables in my analysis and to check the sample for multicollinearity. For the construction of the correlation matrix, the Pearson correlation coefficient was calculated for continuous variables, while for combinations of continuous and binary variables, the Point-Biserial correlation coefficient was applied. According to the results received, it can be observed that there is almost no strong correlation between the control or independent variables included in the model, as the majority of coefficients are lower or around the 0.1 level. Furthermore, some of them are not significant at all.

Considering ESG scores and SCR, it can be noted that there are strong positive relations between these variables (in particular, between ESG score and each of the three SCR). This finding suggests that the hypothesis of the study could be relevant because the estimation of a country's ESG profile could matter for its creditworthiness assessment.

There were only two exclusions: correlations between ESG and OECD membership and ESG and GDP per capita. These two pairs have relatively high correlation coefficients, close to the threshold. Therefore, for them, an additional Variance Inflation Factor (VIF) test was performed during the later stages of the regression model execution. The VIF coefficients were calculated, and none of them exceeded 3, while the threshold value for high multicollinearity is 5. Besides, these two determinants are classic determinants of the SCR; thus, it was expected to find such high correlation coefficients. The same situation was observed by other authors exploring this theme, and despite this correlation, they included both GDP per capita and OECD membership in their research models (Cantor & Packer, 1996; Afonso et al., 2011; Gaillard, 2012; Gartner et al., 2011; Reusens & Croux, 2017;

Osobajo & Akintunde, 2019). Therefore, for the present study, it was decided to keep these two determinants in the equations.

Taking a look at both pairs (ESG-OECD and ESG-GDP per capita) at the same time, it could suggest the same conclusion: developed countries (with higher GDP per capita and which are members of the OECD) tend to prioritize issues related to sustainable development because they have more funds for that. Consequently, they have higher ESG scores. In contrast, developing countries face more significant challenges in terms of general economic and political problems and cannot afford to allocate as much money to the green transition, leading to lower ESG scores. Developed countries have already addressed many of these issues in the previous century (higher social protection, accessible healthcare and educational systems, developed infrastructure, etc.), making them not a central part of their agendas and allowing themselves to proceed to the green transition.

As expected, there is a very high correlation between the SCR of the three chosen CRAs, but this is not relevant for the study as three different regressions with only one SCR were built. It is also worth considering that there are strong relations between any SCR and almost all independent variables chosen. This was also expected because the choice of determinants was based on the literature review. Authors of the articles used had proven that the chosen six explanatory variables have a significant effect on the SCR and are true drivers of these scores. Therefore, these correlations did not pose a problem for further research.

Therefore, it was possible to state that there is no serious multicollinearity between variables.

8.2 Results of the regression models

In the Tables 7 the results of the execution of regression model (1) are presented. Table 7 presents the results of the regression model (1) without the square of the ESG score, whereas Table 8 presents the results of the regression model (2) with the square term. In both cases, the models were estimated three times, once for each of the three providers of sovereign credit ratings (Fitch, S&P and Moody's). Consistency of the estimates between the three estimates can therefore also be viewed as a robustness check.

Table 7: First regression model results
(comparison of three models without the square of the ESG score)

Variable	Coefficients (Fitch assessment)	Coefficients (S&P assessment)	Coefficients (Moody's assessment)
ESG score	0,103*** (0,026)	0,113*** (0,027)	0,093*** (0,029)
GDP per capita	0,0001*** (0,00001)	0,0001*** (0,00001)	0,0001*** (0,00001)
GDP growth	0,082** (0,037)	0,047 (0,038)	0,037 (0,040)

To be continued

Table 7: First regression model results
(comparison of three models without the square of the ESG score) (cont.)

CPI	-0,014*** (0,003)	-0,013*** (0,003)	-0.014*** (0,003)
External debt	-0,007*** (0,002)	-0,004* (0,002)	-0,009*** (0,002)
OECD	1,399*** (0,387)	1,804*** (0,403)	1,775*** (0,422)
Default	-1,266*** (0,291)	-1,581*** (0,302)	-1,178*** (0,317)
Year 2017	-0,170 (0,562)	-0,054 (0,513)	-0,021 (0,562)
Year 2018	-0,417 (0,563)	-0,279 (0,509)	-0,298 (0,563)
Year 2019	-0,455 (0,546)	-0,354 (0,498)	-0,271 (0,546)
Year 2021	-0,1,232* (0,687)	-0,928 (0,589)	-0,825 (0,687)
Constant	7,637*** (1,083)	6,972*** (1,126)	7,795*** (1,180)
Observations	479	479	479
R^2	0,711	0,711	0,678
Adjusted R^2	0,704	0,705	0,670
Residual Std. Error	2,801	2,913	3,053
F statistic	104,412*** (df =11; 467)	104,613*** (df =11; 467)	89,278*** (df =11; 467)
*p<0.1; **p<0.05; ***p<0.01 *Standard errors in parentheses*			

Source: own work

Firstly, all three models are statistically significant at a 1% significance level. It is interesting to note that among all three models, the model based on Moody's assessment has the lowest explanatory power (67%), while the other regressions with Fitch and S&P assessments explain approximately 70% of the total variation of the dependent variable. When considering independent variables, almost all of them are statistically significant at the 1% significance level in all models, except two variables. The GDP growth is statistically significant at the 5% significance level in the model with the Fitch score and statistically insignificant in the other two models. The External debt is statistically significant at a 10% significance level in the S&P model, while in the Moody's and Fitch ones it is as all the other determinants is statistically significant at a 1% significance level. As for the nature of relations between explanatory variables and the SCR, all the signs received as they were expected in accordance with the Table 3.

Regarding the variables of primary interest in the research, it has been established that the ESG score of a country has a statistically significant and positive effect on its creditworthiness assessment, regardless of the credit rating agency used.

In terms of the Gauss-Markov conditions, all of them have been checked for all regressions built and have yielded similar results. The mean of residuals is equal to zero, and the

residuals are normally distributed. However, there is evidence of heteroscedasticity, and there is potential for autocorrelation of higher orders (5 and more). To address the issue of heteroscedasticity, robust standard errors were calculated. All the evidences of the Gauss-Markov conditions check are presented in Appendix 2.

Overall, these findings indicate that the ESG score of a country has a significant positive influence on its sovereign credit rating. The robustness of the results suggests that this relationship holds across different credit rating agencies, strengthening the validity of results.

Considering the second specification, results of executing which are presented in the Table 8.

Table 8: Second regression model results
(comparison of three models with the square of the ESG score)

Variable	Coefficients (Fitch assessment)	Coefficients (S&P assessment)	Coefficients (Moody's assessment)
ESG score	0,682*** (0,175)	0,856*** (0,181)	0,851*** (0,190)
ESG^2	-0,007*** (0,002)	-0,009*** (0,002)	-0,009*** (0,002)
GDP per capita	0,0001*** (0,0001)	0,0001*** (0,0001)	0,0001*** (0,0001)
GDP growth	0,087** (0,037)	0,054 (0,038)	0,044 (0,040)
CPI	-0,014*** (0,003)	-0,013*** (0,003)	-0,014*** (0,003)
External debt	-0,007*** (0,002)	-0,005** (0,002)	-0,010*** (0,002)
OECD	1,596*** (0,388)	2,057*** (0,401)	2,034*** (0,420)
Default	-1,339*** (0,288)	-1,674*** (0,298)	-1,273*** (0,313)
Year 2017	-0,411 (0,557)	-0,364 (0,526)	-0,295 (0,610)
Year 2018	-0,658 (0,572)	-0,588 (0,547)	-0,613 (0,633)
Year 2019	-0,590 (0,538)	-0,528 (0,525)	-0,448 (0,589)
Year 2021	-1,269* (0,672)	-0,976 (0,620)	-0,873 (0,730)
Constant	-3,570 (3,522)	-7,422** (3,639)	-6,873* (3,818)
Observations	479	479	479
R^2	0,718	0,722	0,689
Adjusted R^2	0,710	0,714	0,681
Residual Std. Error	2,771	2,864	3,004
F statistic	98,723*** (df =12; 466)	100,667*** (df =12;466)	85,868*** (df =12; 466)
*p<0.1; **p<0.05; ***p<0.01 *Standard errors in parentheses*			

Source: own work

All three models are statistically significant at a 1% significance level. Upon comparison, it was found that the model with the square of the ESG score has greater explanatory power (and it holds for all three models in other words for SCR provided by any of the three CRA chosen).

In these specifications all comments about control variables are the same. The regression made for the Moody's assessment has the lowest explanatory power – 68%, even though it is higher than in the first specification, while the other regressions with Fitch and S&P have the explanatory power of approximately 71%. Therefore, each model has gained 1% to its ability to explain the total variation of the dependent variable. Other from ESG, all determinants of the SCR are statistically significant at the 1% significance level in all models. Again, the exceptions are GDP growth and External debt, with GDP growth not being significant in S&P and Moody's models and External debt being significant at 5% in the S&P model. In this specification all the assumptions about signs (see Table 3) were again confirmed.

Considering the ESG score and the ESG score square, calculations have revealed that both of the variables are statistically significant at a 1% significance level. This finding means that there are quadratic relations between the SCR and CRA, and there is a point after which further financing of sustainable development would increase a country's risks in relation to higher external debt and affect its SCR assessment (this is described in more details in the next section).

Gauss-Markov conditions were also checked for these specifications. The results were the same as for the first three specifications. The mean of residuals is equal to zero, and the residuals are normally distributed. Again, there was identified heteroscedasticity and potential autocorrelation of higher orders (5 and more). To address the issue of heteroscedasticity, robust standard errors were calculated. All the evidence of the Gauss-Markov conditions check is presented in Appendix 3.

To conclude, the results allow us to assume that the ESG assessment of a country has a significant influence on its sovereign credit rating, and that these relations are quadratic, implying that after a certain level of successful realization of green transition objectives, the continuation of this policy would lower the SCR score, which could be due to the financial aspect of the issue. Overall, the results are robust, and this relationship holds across different credit rating agencies, strengthening the validity of the findings.

8.3 Interpretation of the results

The analysis of the results of the first three models (without a square of the ESG score) reveals a direct positive relationship between a country's ESG score and its credit rating assessment. It is important to refer back to Table 2 for clarification, as in the context of this

study, positive relationship means that a 1 point increase of the ESG score of a country leads to an improvement in the country's creditworthiness assessment. This interpretation is based on the coding system outlined in Table 2, where a higher credit rating point indicates a higher position on the credit agencies' scale and, consequently, a better rating for the country.

In other words, the findings suggest that higher ESG scores are associated with better credit ratings, indicating that countries with stronger performance in ESG areas tend to receive more favourable credit ratings from these agencies. This result supports the idea that sustainable and responsible policies in these areas can enhance a country's creditworthiness and attractiveness to investors.

Regarding the strength of the effect, it appears to be relatively consistent across the models that were estimated. The S&P-based model showed the strongest effect, indicating that an increase of the ESG score by 1 point led to an improvement of the country's creditworthiness assessment by 0.113 points. The Fitch and Moody's models showed slightly lower effects, with increases of approximately 0.103 for Fitch models and 0.093 for Moody's models.

As a result, it can be concluded that Hypothesis 1 has been confirmed: the ESG score of a country has a positive and significant effect on its sovereign credit rating. This implies that countries with higher ESG scores tend to receive better credit ratings, which can have positive implications for their access to capital and overall financial stability.

Further analysis demonstrated that developed countries generally have higher SCR scores. In the case a country is a member of the OECD (in other words considered to be developed) it has a higher SCR by 1.399 or 1.804 or 1.775 points the Fitch, S&P and Moody's models, respectively.

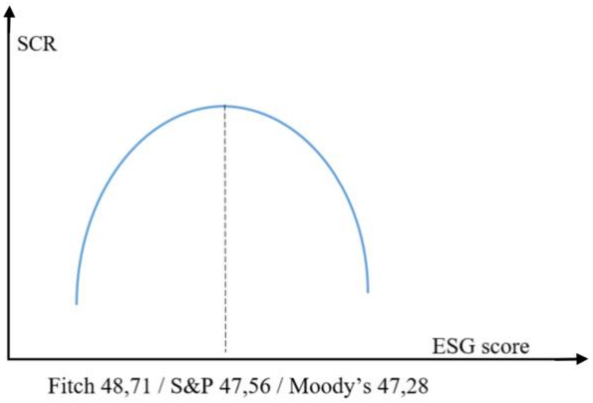
Therefore, the second conclusion confirms that Hypothesis 2, as proposed in the second section of the work, has also been validated. This means that there are quadratic relationships between the ESG score of a country and its sovereign credit rating, so that after a certain point further rise of the ESG score could be associated with a decrease of its SCR.

To provide a detailed interpretation of the results obtained based on the analysis of the second specification models, necessary calculations were performed. They are presented in Appendix 4. These calculations make it clear that there are quadratic relations between the ESG score of a country and its creditworthiness assessment. Moreover, these relations can be described with a graph in Figure 7. This is a parabola opened down with the saddle point at 48.714 ESG points for a Fitch model, 47.56 for the S&P model and 47.28 for the Moody's model2. This point means that before the calculated for each model ESG points, a country's

[2] Fort he calculation of the maximum point the standard formula fort the saddle point calculation was applied to the regresion coefficients received for each of the models separately. The formula is: $x = -\frac{B}{2*A}$.

sovereign rating is increasing, while after that point, further improvement in the overall sustainable development level of a country leads to the lowering of its creditworthiness estimation.

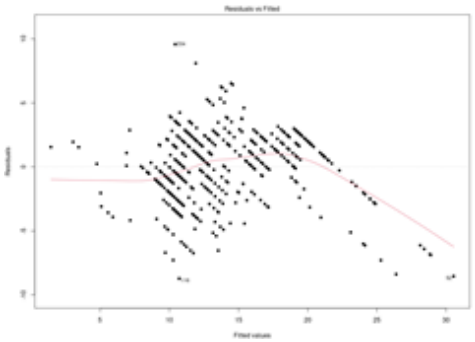
Figure 7: Quadratic relations between the ESG score of a country and its SCR



Source: own work

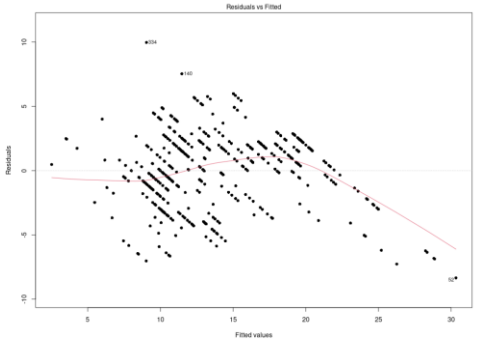
However, Figure 7 represents just a concept illustration of the findings. In order to prove nature of relations between the overall ESG score of a country and its SCR additional graphs were made, which are represented on the Figure 8, 9 and 10. These graphs confirms the results described before (the red line was added to graphs which shape reminds parabola).

Figure 8: Results of the Fitch model with the quadratic relations



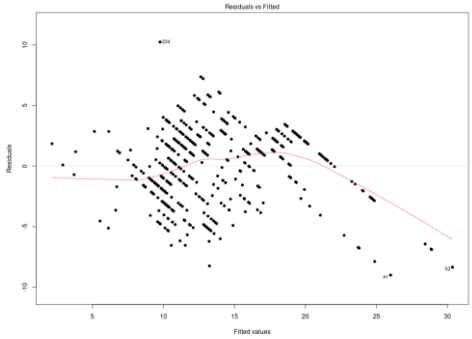
Source: own work

Figure 9: Results of the S&P model with quadratic relations



Source: own work

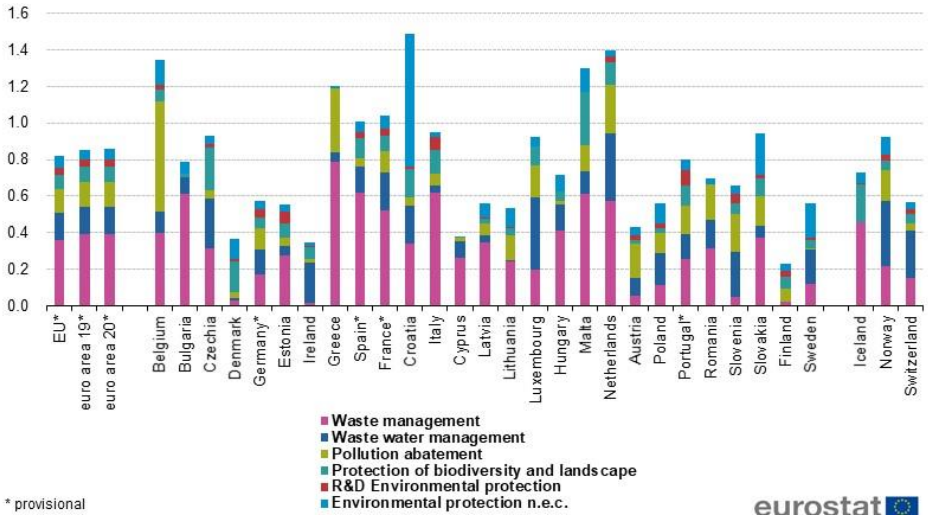
Figure 10: Results of the Moody's model with quadratic relations



Source: own work

The findings revealed with the help of the second specification are quite interesting. As it has been written in the chapter devoted to the hypothesis proposition, a probable explanation for such relations could be the fact that financing different political programs targeting the acceleration and general promotion of sustainable development is quite considerable. For example, the EU promised to gather around 1 trillion euros to invest in the realization of the EGD. The in-depth view into that topic can be supported with Figure 11, which presents expenditures of the EU member countries on different environmental protection projects. There are some countries, like Portugal and Greece, whose debt-to-GDP ratio in 2022 equalled 113.9% and 171% respectively, while both countries have to follow the general EU political stream and allocate some funds to the EGD program (0.8% and 1.2% of their GDP in 2021 respectively). It is reasonable to assume that further deepening of the EU sustainability development politics will put a considerable burden on these countries' budgets, and the potential rise of their ESG scores could be financed with additional external loans. As a result, their creditworthiness could be affected and finally lead to the drop of their SCR score.

Figure 11: Total government expenditures on 'environmental protection', 2021 (% of GDP)



Source: Eurostat

Regarding the choice of credit rating agencies, it is important to note that all of the models exhibit similar explanatory power. Given this, it is not possible to assert that a model based on the assessment of a specific agency is superior to others. Therefore, the selection of a particular regression model should be based on the specific research objectives, requirements, and conditions of the study at hand.

The interpretation of all the control variables aligns with the theoretical assumptions:

- An increase in GDP per capita leads to a higher credit rating for a country, as it signifies an overall growth in the output, indicating improved economic activity and increased economic performance of companies;
- A higher GDP growth rate positively affects a country's creditworthiness as it reflects increased economic activity and greater prosperity;
- An increase in the price level (inflation) adversely impacts country's economic conditions, leading to a reduction of its ability to repay (particularly external) debts. Consequently, credit rating agencies lower their assessments of the country;
- A growth of a country's external debt is seen as a direct indicator of deteriorating credibility. Credit rating agencies take note of this and lower their assessments of the state;
- If a country is a member of the OECD in other words is considered to be developed (OECD = 1), it implies its awareness about sustainability issues, higher interest in promotion of a green transition and greater ability to allocated more budget money on different projects in this field;
- If a country has previously defaulted on its obligations (i.e. Default = 1), it significantly impacts its reputation, both in the short and long term. The immediate effect is a downgrade in the country's sovereign credit rating. Credit rating agencies become more cautious in their assessments, resulting in lower final ratings.

The findings of this study clearly affirm that in the modern world, the significance of ESG factors for a country's overall development trajectory has become as crucial as traditional economic indicators. This substantial shift has transpired over the past 10-20 years, primarily owing to the efforts of developed countries, with a prominent role played by the EU.

In this context, it is pertinent to introduce the ESG factor as a new catalyst for improving a country's sovereign credit rating. This tool can be wielded by governments to attain a more favourable position in the financial market, on the international economic stage, and ultimately enhance the country's reputation. The strong motivation for leaders to leverage this knowledge underscores the expectation that they will make judicious use of these insights in shaping their countries' economic and environmental policies.

Nonetheless, the mechanism described above may have a significant 'side effect' for all countries, affecting their economic strategies and sometimes forcing them to go beyond their

financial capacity, putting them in a difficult and risky position. For example, EU member countries exhibit a high level of awareness about the significance of environmental preservation, human rights protection, and maintaining a positive government reputation. Consequently, these member states have already implemented many measures aimed at integrating ESG principles into their core political and administrative frameworks. All of the countries are in different economic circumstances; however, for all of them, further pushing forward the sustainability agenda brings additional expenses.

Some states have a stronger economic system and greater budget capacities than others, but even for them, at a certain point, it will become a tough task to continue fulfilling all their main state responsibilities: social programs (scholarships, pensions, healthcare and educational systems, etc.), economic (governmental investments into infrastructure, funding start-ups, etc.), cultural (financing theatres, exhibitions, etc.), and other important fields of the normal state functioning. Developed countries are called developed precisely because of the high quality of all governmental services they provide and the high efficiency of their administration.

Conversely, countries with lower levels of economic development have different priorities as they often lack the financial resources to support ESG-related programs. These nations grapple with more basic challenges, similar to those some EU members (like Germany) faced in the past and still contends with to some extent. These issues include low minimum wages, subpar education systems, limited access to higher education, inadequate infrastructure, underdeveloped administrative systems, and more. In this context, it is reasonable to expect that the leaders of such countries will prioritize addressing these fundamental challenges over investing in ESG initiatives.

In both cases, regardless of the level of a country's advancement, at a certain point, any state would not have enough funds to increase investments into sustainability while also maintaining or increasing undisputed money allocation for general issues.

Nonetheless, it is conceivable that even in developing regions of the world, ESG promotion could yield advantages. By enhancing their internal ESG factors, governments can potentially influence their sovereign credit ratings and enhance their standing on the international political stage. Through this avenue, they can significantly expand their prospects for forging new political and economic partnerships, accessing funding from various sources globally, bolstering their creditworthiness, and simultaneously improving lending terms. Thereby, the findings are aligned with the economic reality by showing a stable growth of the SCR up to certain level of the sustainable advancement expressed vie the ESG score.

Nevertheless, in spite of potential challenges and economic threats, these domestic improvements can also lead to overall economic growth and an enhancement of living

conditions for the nation's citizens. The benefits are manifold: better environmental conditions can positively impact the population's health, potentially extending life expectancy (and consequently the active working age), while also contributing to global environmental preservation efforts. In terms of the social dimension, enhanced protection of employees' rights and safer working conditions can benefit the workforce, and people tend to feel more secure when they perceive strong governmental social support. The role of the G-governance aspect is closely linked to the overall effect of a higher sovereign credit rating because a more transparent and less corrupt government tends to earn greater respect and trust from international partners, resulting in more successful negotiations.

Another noteworthy finding is the variation in explanatory power among the three different models based on the assessments of the three credit rating agencies. Tables 7 and 8 indicate that both Moody's assessment-based models have slightly lower explanatory power. While this was not the primary focus of the present study, this observation indirectly suggests that among the three sovereign credit rating agencies, Moody's may be the least ESG-oriented and advanced in considering ESG factors. In contrast, S&P and Fitch appear to be more progressive in this regard, as evidenced by the fact that these two agencies maintain a separate evaluation system and database dedicated exclusively to measuring the ESG scores of countries worldwide.

9 CONCLUSION

The primary objective of this research was to investigate the impact of a country's overall ESG score on its sovereign credit rating assessments provided by credit rating agencies. To achieve this objective, a comprehensive analysis was conducted.

The initial step involved a detailed examination of all three components of the ESG framework, which encompassed research into the green economy, transition, and financial markets, as well as an exploration of responsible social development principles and the importance of transparent and high-quality corporate governance. Subsequently, an investigation into the concept of sovereign credit ratings, including their main determinants, influence mechanisms, and recent research findings, was carried out. Finally, a review of existing empirical studies on the subject was conducted to validate the proposed hypotheses. The literature review revealed a notable increase in interest in ESG scores and their impact on various aspects over the past decade. This shift in academic research focus reflects the growing importance of sustainability and responsible investing. However, it also highlighted a significant gap in the scientific literature when it comes to questions related to sustainable development. Most existing studies tend to examine the role of ESG policies at the corporate level but often do not explore their impact on a country's overall economy.

These conclusions underscore the importance of the present study, which sought to address this research gap. The empirical part of the study involved several steps. The first step was

to compile a representative database, select appropriate control variables, define relevant measurements of the included determinants, and construct an appropriate model. The second stage consisted of performing regression analysis, with the ordinary least squares (OLS) multiple regression being the chosen model. Two different regression models were developed, one with a square term of the overall ESG score of a country and another without this term. Additionally, the study considered three different sovereign credit rating agencies' assessments: S&P, Fitch, and Moody's, resulting in multiple regression models for each agency's assessment.

The findings of this study have substantiated both hypotheses put forward: the ESG score of a country has a positive impact on its sovereign credit rating, and these relations are of a quadratic nature. Up to a certain point (which was calculated additionally for each of the three CRAs), the increase in the overall ESG score of a country leads to an increase in its CRA estimation. However, beyond this level, further promotion of sustainability issues contributing to the rise in the ESG score negatively affects the creditworthiness of a country, ultimately lowering its SCR.

The results of this study suggest that in the context of the increasing importance of sustainability development, the ESG assessment of a country's policies in this field could become a new determinant of a country's creditworthiness, gaining significant relevance in the coming decade. In the modern world, there is a need for a new baseline idea to guide the next phase of evolution. Sustainable development, particularly the transition to a green economy, has the potential to serve as this new framework, shaping the direction of the future in a manner reminiscent of the industrial revolution of the 21st century.

The transition to a green economy will necessitate the development of new technologies to make production more environmentally friendly. This, in turn, will require new research and scientific advancements to create eco-friendly machinery. The construction industry will also play a crucial role in building new manufacturing facilities and infrastructure, leading to increased demand for labour and the emergence of new professions and skills among employees. The transformation process will also extend to the education sector, as new skills and knowledge will be required to support these changes.

It is also important to mention that new technologies will enable us to achieve higher levels of productivity and stimulate economic activity. As a result, society can enhance its welfare and, consequently, ensure the improved provision of social services, better protection of rights, and a reduction in inequality in various spheres (such as gender and race). However, to fully benefit from these technological breakthroughs, it will be crucial to ensure higher quality management practices, more transparent business leadership processes, and the establishment of fair conditions for the eradication of bribery and corruption.

Therefore, it is becoming evident that the ESG concept is a more potent tool than merely a new theory. It comprises three equally vital elements – environmental, social, and governance – which are closely interconnected, creating a reinforcing effect and promoting one another.

Considering the potential financial pressure on countries, it is relevant to note that in states where primary economic issues have been addressed, there are more resources (financial, temporal, and attention-related) available to tackle ESG-related problems. However, even for them, accelerating the green transition, hastening all stemming processes, and pushing technologies to higher advancement levels can become a challenging task. Therefore, for states with emerging economies, the promotion of ESG could engender an even more complicated situation.

Nevertheless, for all countries in a modern world sustainability development can serve as an effective tool to attract investments from all around the globe through collaborative environmental projects. Developing countries are often located in regions rich in natural resources suitable for green technologies, such as solar or wind power plants, while developed ones have greater scientific base, technical support and financial capacity. In this light, enforcement of ESG policies could facilitate integration between all countries, motivate them to search potential points to make an effective collaboration, use each other strong sides for mutual economic enforcement, help partners to easier overcome challenges of the coming sustainable are, make green transition to become real and help to build the new generation world economic system.

When comparing the assessments of the three credit rating agencies, it was somewhat surprising to find that the models based on Moody's sovereign credit ratings exhibited slightly weaker explanatory power. Although the difference is not significant, it suggests that Moody's may be the least focused on ESG factors among the three considered agencies, while S&P and Fitch appear to be more advanced in terms of sustainability development.

The results of this study could be of interest to various stakeholders. Firstly, government officials and administrators in governmental institutions may find this research relevant. Understanding the potential positive impact of ESG promotion can serve as a motivating factor for them to collaborate in the development of comprehensive economic and social programs. If these programs are implemented simultaneously, it can lead to greater effectiveness and contribute to a country's overall development.

Another group that can benefit from these findings is investors. Currently, investors often rely on conventional indices for decision-making. However, by considering the profitability of green projects and the favourable natural conditions in certain countries, investors may be more inclined to take additional risks in pursuit of higher profitability. This, in turn, can benefit the first group (governments) by attracting foreign investment.

Furthermore, this research has the potential to contribute to the existing academic practice by shedding light on the ESG issue at the governmental level, which has not been the primary focus of previous research.

It is important to address some limitations of this study. Firstly, the analysis revealed issues of heteroscedasticity and autocorrelation of the highest orders (5 and more) in the models. It is highly likely that there may be other important and necessary determinants that should be included in the model, or there could be excessive regressors that need to be removed. It is also possible that a different functional form might describe the relationships between the studied phenomena more accurately. Moreover, cross-sectional data was used in this study due to a significant number of missing data, which may not have been the most efficient approach to achieve the research aim.

Another constraint is the use of the EcoVadis ESG score, which employs a closed methodology. As a result, it is not possible to thoroughly analyse and verify the model or data used by the agency. The specific criteria considered and the indices used to calculate the ESG score are not disclosed, making it difficult to assess the exact factors influencing the score.

There is an opportunity to further this study by attempting to address all econometric issues. It is also possible to explore a more suitable functional form for the regression equation. If access to more advanced databases becomes available, it would enable the compilation of a more robust sample, the elimination of missing data, and the implementation of a panel data model. Additionally, with access to more reliable data, it would be intriguing to develop a unique methodology for assessing a country's ESG score. This could help control the evaluation process, consider all essential factors, and enhance transparency in score calculation. Such an approach would enhance the reliability of a state's ESG score. Furthermore, it would offer a more adaptable system for assessing a country's ESG score, allowing for adjustments in response to changing political and economic conditions. This could lead to a more individualized assessment, considering the specific social, cultural, political, and economic conditions of each country.

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APPENDICES

Appendix 1: Povzetek (Summary in Slovene langauge)

Cilj predstavljene magistrske naloge je bil preučiti vpliv ESG ocene države na bonitetno oceno njenega kreditnega tveganja. Obširni pregled strokovne literature s področja trajnostnega in zelenega razvoja, njunega vpliva na razvoj gospodarstva držav je bil opravljen. Ta analiza je dovolila ugotoviti, da danes obstaja vrzel v znanstvenem razumevanju vpliva ESG ocene države na bonitetno oceno njenega kreditnega tveganja. Poleg tega je bilo opaženo, da sodobnimi znanstveniki še niso posvetili veliko pozornosti proučevanju in analize narave odnosov med ESG oceno države in njeno bonitetno oceno.

Na podlagi teh sklepov sta bili zastavljeni dve hipotezi:

- Hipoteza 1: ESG ocena države je pozitivno povezana z bonitetno oceno njenega kreditnega tveganja;
- Hipoteza 2: Obstaja kvadratno razmerje med ESG oceno države in bonitetno oceno njenega kreditnega tveganja, tako da po določeni točki nadaljnji dvig ocene ESG lahko povzroči znižanje bonitetne ocene kreditnega tveganja države.

Nadaljnja natančna analiza strokovne literature in znanstvenih raziskav, ki so bili posvečeni proučevanju determinant kreditne ocene države, je omogočila opredelitev najbolj primernega raziskovalnega modela (lenjeni regresijski model in regresijski model z kvadratom ESG ocene) in izbiro kontrolnih spremenljivk. Podatki so bili zbrani iz različnih virov, kot so baze podatkov Standard & Poor's, Bloomberg, Fitch, Svetovna Banka. Ključna spremenljivka, ESG ocena države, je bila pridobljena iz baze podatkov EcoVadis. Vzorec je vseboval 479 opazovanj, ki je vključeval podatke za obdobje od 2017 do 2021.

Analiza rezultatov je prikazala, da države, ki izkazujejo bolj vestno ravnanje zadev trajnostnega razvoja, pridobivajo višje bonitetne ocene. Poleg tega je bilo ugotovljeno, da so odnosi med ESG oceno države in bonitetno oceno njenega kreditnega tveganja kvadratične. Po doseganju določeni ravni ESG ocene (ki se malo razlikujejo med tremi zbranimi agencijami) nadaljnjo prizadevanje za uresničevanje trajnostnih ciljev povzroča znižanje ocene kreditne sposobnosti države.

Opravljena raziskava je nakazala, da sta danes napredne politike na področju trajnostnega razvoja in ESG ocena države lahko precej učinkovito orodje za izboljšanje bonitetne ocene države. Skupaj primerne trajnostne politike in ESG ocena države lahko pospešujeta, podpirata in preganjata globalno promocijo načel ESG. Tudi je vredno omeniti, da pristop k trajnostnemu razvoju države mora biti dobro premišljen s strani vlade, da ne bi dodatno obremenjeval državnega proračuna s financiranjem zelenega prehoda s pomočjo dodatnih posojil, kar lahko znižuje bonitetno oceno kreditnega tveganja države.

Appendix 2: Gauss-Markov conditions check for three specifications without the square of the ESG score

All of the five Gauss-Markov conditions were checked.

1. If a mean of residuals is equal to 0: $E(\varepsilon_i) = 0$ – satisfied

Table 1: Results of the check if a mean of residuals is equal to 0

	Fitch model	S&P model	Moody's model
Value of a mean calculated	5.68595e-18	3.472344e-17	4.851431e-17
p-value	1	1	1
H_0: mean of residuals equals to 0	is not rejected at a 10 % significance level	is not rejected at a 10 % significance level	is not rejected at a 10 % significance level

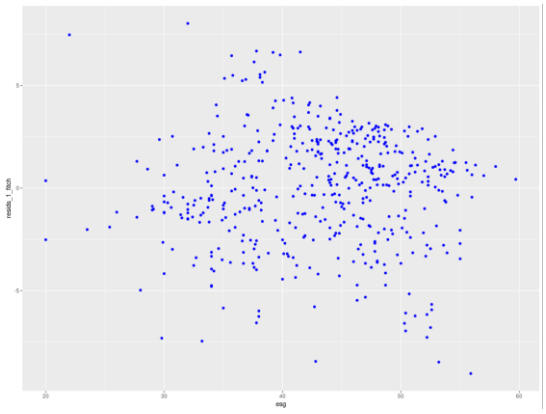
Source: own work

Results suggested that the residual mean equals to zero.

2. Homoscedasticity: error random variables have to be homoscedastic, which means that they all have the same finite variance – $\sigma^2(\varepsilon_i) = \text{const}$ – not satisfied

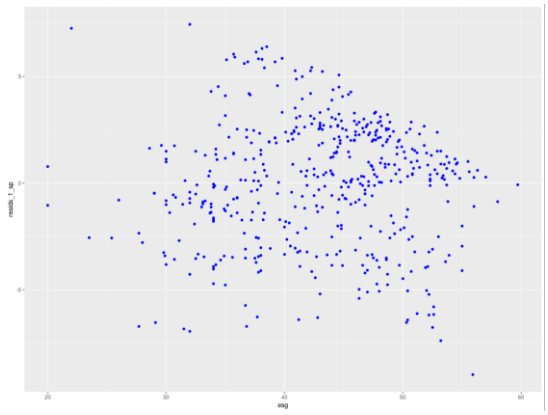
These conditions were checked with the use of residuals plot (Figures 1, 2 and 3) and the Breusch-Pagan test.

Figure 1: Residuals vs Fitted plot (Fitch model)



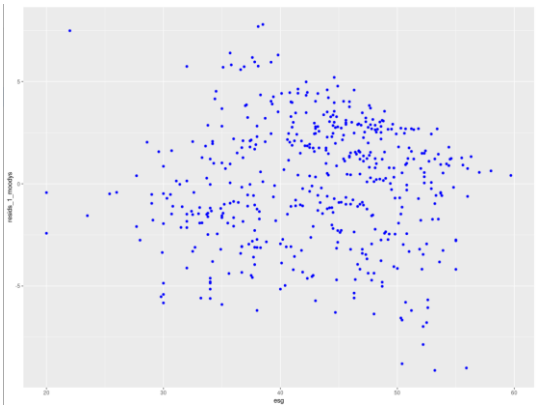
Source: own work

Figure 2: Residuals vs Fitted plot (S&P model)



Source: own work

Figure 3: Residuals vs Fitted plot (Moody's model)



Source: own work

Table 2: Results of the Breusch-Pagan test

	Fitch model	S&P model	Moody's model
p-value	7.954e-10	6.869e-07	1.654e-10
H_0: residuals are homoscedastic	is rejected at a 1 % significance level	is rejected at a 1 % significance level	is rejected at a 1 % significance level

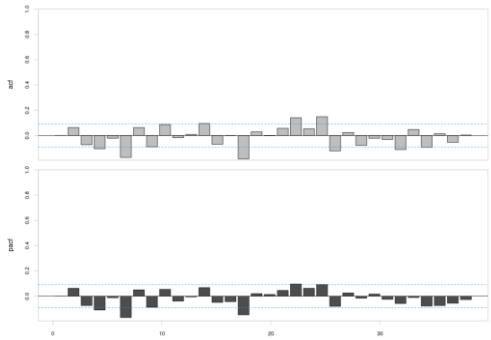
Source: own work

Results suggested that there is a heteroscedasticity problem, that is why, robust standard errors were calculated.

3. There is no autocorrelation: distinct error terms are uncorrelated – $\mathrm{cov}(\varepsilon_i, \varepsilon_j) = 0$ $(i \neq j)$ – satisfied

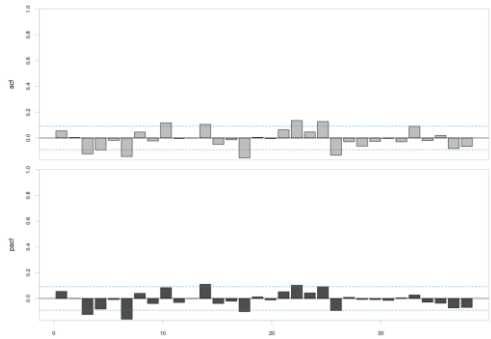
For the check of this conditions autocorrelations plots (Figure 4, 5, and 6) were built as well as the Durbin-Watson Test was performed.

Figure 4: Autocorrelation plot for the Fitch model



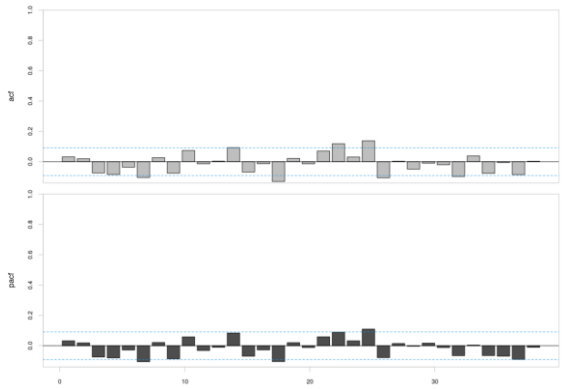
Source: own work

Figure 5: Autocorrelation plot for the S&P model



Source: own work

Figure 6: Autocorrelation plot for the Moody's model



Source: own work

Table 3: Results of the Durbin-Watson test

	Fitch model	S&P model	Moody's model
p-value	0.4114	0.07888	0.1832
H_0: there is no 1st order correlation	is not rejected at the 10 % significance level	is not rejected at the 5 % significance level	is not rejected at the 10 % significance level

Source: own work

Results suggested that there is no autocorrelation of the first even though there could potentially be an autocorrelation of higher orders (6th and 15th order).

4. Endogeneity: an explanatory variable should not be correlated with the error term – $\mathrm{cov}(x_i, \varepsilon_i) = 0$ – satisfied

In order to determine whether this condition is met, potential reasons why autocorrelation could arise were analyzed.

First, neither the linear nor the nonlinear models included a lagged dependent variable among the determinants. Secondly, within the framework of this study, there was no possibility for a phenomenon of self-selection to affect data, since all the necessary information is disclosed on the independent web pages of the organizations with the worldwide recognize reputation (World Bank, S&P, Bloomberg etc.). Regarding omitted variables, it is assumed that detailed analysis of various sources allowed an accurate determination of the list of determinants.

Thus, based on the semantic concept of the study, we can conclude that this condition is met and guarantees the unbiased and consistent OLS estimates of the models.

5. Normality: residuals are normally distributed – $\varepsilon_i \sim N(0, \sigma^2)$ – satisfied in one out of three models (S & P)

The commonly used Jarque–Bera test was applied in order to check the normality of errors distributions.

Table 4: Results of the Jarque-Bera test

	Fitch model	S&P model	Moody's model
p-value	0.00289	0.05385	0.03254
H_0: residuals are normally distributed	is rejected at the 1 % significance level	is not rejected at the 5 % significance level	is rejected at a 5 % significance level

Source: own work

Results suggested that the residuals are normally distributed.

Appendix 3: Gauss-Markov conditions check for three specifications with the square of the ESG score

All of the five Gauss-Markov conditions were checked.

1. If a mean of residuals is equal to 0: $E(\varepsilon_i) = 0$ – satisfied

Table 5: Results of the check if a mean of residuals is equal to 0

	Fitch model	S&P model	Moody's model
Value of a mean calculated	-1.502356e-17	-1.496763e-16	-4.393124e-17
p-value	1	1	1
H_0: mean of residuals equals to 0	is not rejected at a 10 % significance level	is not rejected at a 10 % significance level	is not rejected at a 10 % significance level

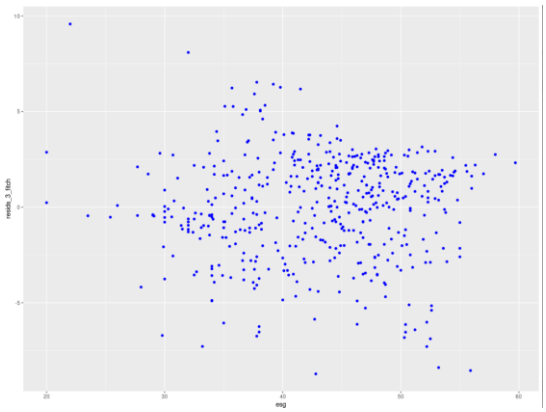
Source: own work

Results suggested that the residual mean equals to zero.

2. Homoscedasticity: error random variables have to be homoscedastic, which means that they all have the same finite variance – $\sigma^2(\varepsilon_i) = \text{const}$ – not satisfied

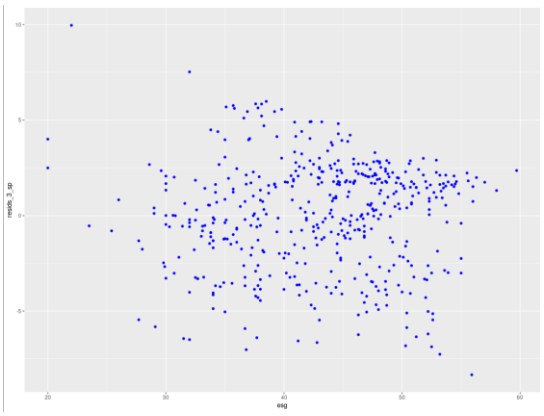
These conditions were checked with the use of residuals VS fitted plot (Figures 7, 8 and 9) and the Breusch-Pagan test.

Figure 7: Residuals vs Fitted plot (Fitch model)



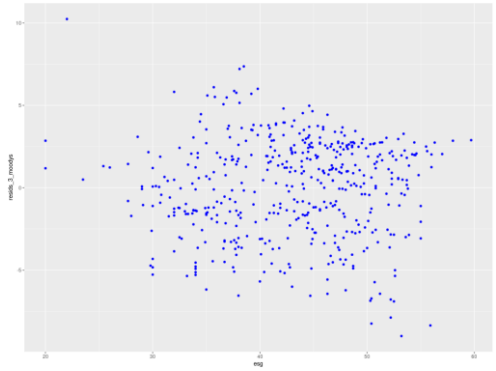
Source: own work

Figure 8: Residuals vs Fitted plot (S&P model)



Source: own work

Figure 9: Residuals vs Fitted plot (Moody's model)



Source: own work

Table 6: Results of the Breusch-Pagan test

	Fitch model	S&P model	Moody's model
p-value	1.6e-09	2.292e-07	1.545e-09
H_0: residuals are homoscedastic	is rejected at a 1 % significance level	is rejected at a 1 % significance level	is rejected at a 1 % significance level

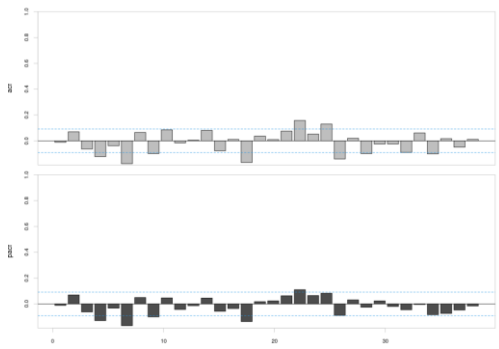
Source: own work

Results suggested that there is a heteroscedasticity problem that is why, robust standard errors were calculated.

3. There is no autocorrelation: distinct error terms are uncorrelated – $\mathrm{cov}(\varepsilon_i, \varepsilon_j) = 0$ $(i \neq j)$ – satisfied

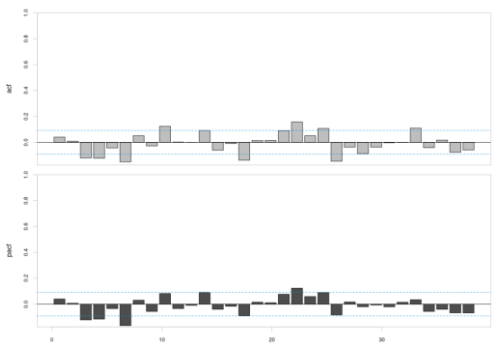
For the check of this conditions autocorrelations plots (Figure 10, 11 and 12) were built as well as the Durbin-Watson Test was performed.

Figure 10: Autocorrelation plot for the Fitch model



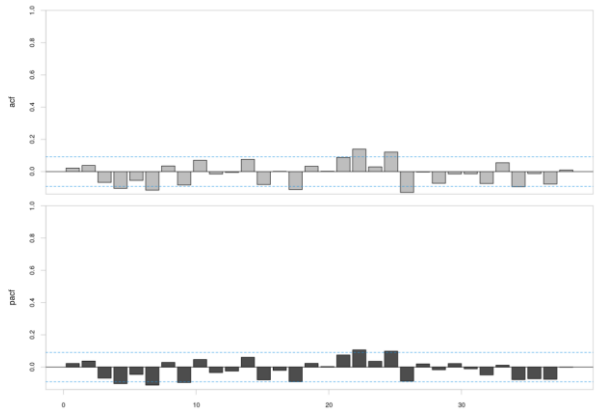
Source: own work

Figure 11: Autocorrelation plot for the S&P model



Source: own work

Figure 12: Autocorrelation plot for the Moody's model



Source: own work

Table 7: Results of the Durbin-Watson test

	Fitch model	S&P model	Moody's model
p-value	0.5227	0.1387	0.2473
H_0: there is no 1st order correlation	is not rejected at a 10 % significance level	is not rejected at a 10 % significance level	is not rejected at a 10 % significance level

Source: own work

Results suggested that there is no autocorrelation of the first even though there could potentially be an autocorrelation of higher orders (6th order).

4. Endogeneity: an explanatory variable should not be correlated with the error term – $\text{cov}(x_i, \varepsilon_i) = 0$ – satisfied

In order to determine whether this condition is met, potential reasons why autocorrelation could arise were analyzed.

First, neither the linear nor the nonlinear models included a lagged dependent variable among the determinants. Secondly, within the framework of this study, there was no possibility for a phenomenon of self-selection to affect data, since all the necessary information is disclosed on the independent web pages of the organizations with the worldwide recognize reputation (World Bank, S&P, Bloomberg etc.). Regarding omitted variables, it is assumed that detailed analysis of various sources allowed an accurate determination of the list of determinants.

Thus, based on the semantic concept of the study, we can conclude that this condition is met and guarantees the unbiased and consistent OLS estimates of the models.

5. Normality: residuals are normally distributed – $\varepsilon_i \sim N(0, \sigma^2)$ – not satisfied

The commonly used Jarque–Bera test was applied in order to check the normality of errors distributions.

Table 8: Results of the Jarque-Bera test

	Fitch model	S&P model	Moody's model
p-value	0.0003042	0.03788	0.01647
H_0: residuals are normally distributed	is rejected at the 1 % significance level	is rejected at the 5 % significance level	is rejected at a 5 % significance level

Source: own work

Results suggested that the residuals are normally distributed.

Appendix 4: Additional calculations for the analysis of the ESG square effect

The standard quadratic equation:

$$Y = A * X^2 + B * X + C \quad (1)$$

The regression model executed:

$$SCR_{it} = \beta_0 + \beta_1 * ESG_{it} + \beta_2 * ESG_{it}^2 + Controls_{it} + \varepsilon_{it}, \quad (2)$$

That is why we can say that:

$A = \beta_2$
$B = \beta_1$

In order to find a saddle point we have to use a special formula. In order to find a certain point for each of the CRA we have to use the coefficients received in the equation for the exact agency. So, the calculations are:

1. Formula: $x = -\frac{B}{2*A}$, (3)

   $ESG_{it} = -\frac{\beta_1}{2*\beta_2}$, (4)

2. Calculation of a saddle point:

Table 9: Calculations of a saddle points for each of three basic models

	Fitch model	S&P model	Moody's model
β_1	0,682	0,856	0,851
β_2	-0,007	-0,009	-0,009
point	$-\frac{0,682}{2*(-0,007)} = 48,71$	$-\frac{0,856}{2*(-0,009)} = 47,56$	$-\frac{0,851}{2*(-0,00)} = 47,28$

Source: own work

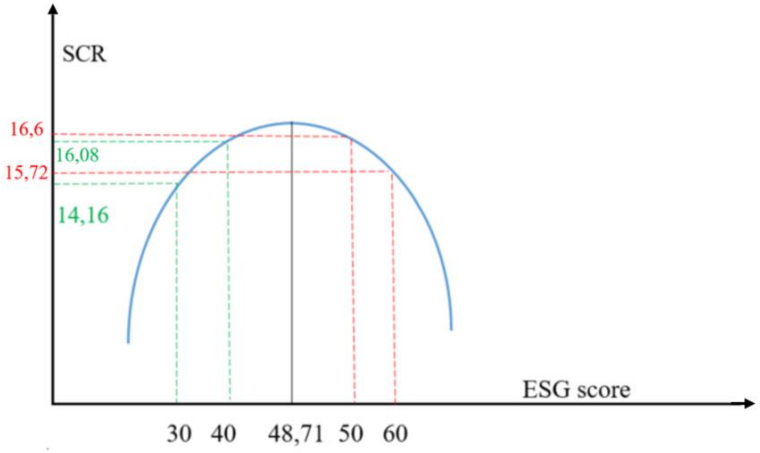
Table 10: Example calculations of values of the SCR depending on different values of the ESG score

	Fitch model	S&P model	Moody's model
	ESG under the saddle point		
ESG scorer = 30	$0,682*30 – 0,007*30^2$ = 14,16	$0,856*30 – 0,009*30^2$ = 17,58	$0,851*30 – 0,009*30^2$ = 17,43
ESG scorer = 40	$0,682*40 – 0,007*40^2$ = 16,08	$0,856*40 – 0,009*40^2$ = 19,84	$0,851*40 – 0,009*40^2$ = 19,64
Change	+ (increase)	+ (increase)	+ (increase)
	ESG above the saddle point		
ESG scorer = 50	$0,682*50 – 0,007*50^2$ = 16,6	$0,856*50 – 0,009*50^2$ = 20,3	$0,851*50 – 0,009*50^2$ = 20,05
ESG scorer = 60	$0,682*60 – 0,007*60^2$ = 15,72	$0,856*60 – 0,009*60^2$ = 18,96	$0,851*60 – 0,009*60^2$ = 18,66
Change	- (decrease)	- (decrease)	- (decrease)

Source: own work

In order to illustrate the found relations, the graph presented on the Figure 13 was made. For purposes of example, the graph was built only for Fitch model calculated parameters. With the green color, the values of the SCR received from the ESG scores smaller than a saddle point were highlighted to show an increase of the SCR in response to an increase of the ESG score. With the red color, the values of the SCR received from the ESG scores greater than a saddle point were highlighted to show a decrease of the SCR in response to a further increase of the ESG score.

Figure 13: Illustration of the quadratic relations between the SCR and the ESG score (example of Fitch model results)



Source: own work