CHARLES UNIVERSITY
FACULTY OF SOCIAL SCIENCES
Institute of Economic Studies

ESG score and corporate financial performance in controversial industries

Bachelor's thesis

Author: Ji Jia Xin

Study program: Ekonomie a finance

Supervisor: PhDr. Jiří Kukačka, Ph.D.

Year of defense: 2024

Declaration of Authorship

The author hereby declares that he or she compiled this thesis independently, using only the listed resources and literature, and the thesis has not been used to obtain any other academic title.

The author grants to Charles University permission to reproduce and to distribute copies of this thesis in whole or in part and agrees with the thesis being used for study and scientific purposes.

During the preparation of this thesis, the author used the DeepL Write paraphrasing tool in order to improve the readability of the thesis. After using this tool, the author reviewed and edited the content as necessary and takes full responsibility for the content of the publication.

Prague, April 30, 2024

Ji Jia Xin

Abstract

The thesis analyses the relationship between ESG performance and the corporate financial performance of companies listed in the S&P 500 index. The analysis first confirms the continued validity of the positive synergy hypothesis, even using the most up-to-date datasets covering the COVID-19 crisis followed by a period of increasing interest rates worldwide. Furthermore, it provides key insights through a comparative analysis between sin and other industries. While no significant differences emerge for companies in the sin industry as a whole, a closer examination of individual industries within the sin triumvirate reveals notable differences. For tobacco companies, the impact of the relationship between ESG performance and corporate financial performance in both directions appears to be significantly lower than for other industries. Conversely, the effect for alcoholic beverage producers is more complex, with the environmental and social pillars having a significantly stronger impact on financial performance than for other companies. Interestingly, the gambling industry shows no significant effect when controlling for other factors.

JEL Classification	A13, G30
Keywords	ESG score, financial performance, controversial industry, panel VAR, Granger causality
Title	ESG score and corporate financial performance in controversial industries

Author's e-mail	94650100@fsv.cuni.cz
Supervisor's e-mail	jiri.kukacka@fsv.cuni.cz

Abstrakt

Práce analyzuje vztah mezi výkonností ESG a finanční výkonností společností zařazených do indexu S&P 500. Nejprve potvrzuje stále přetrvávající platnost hypotézy o pozitivní synergii, a to i za použití nejaktuálnějších dat, pokrývající COVID-19 krizi a následného období globálního růstu úrokových sazeb. Dále poskytuje zajímavé poznatky prostřednictvím komparativní analýzy mezi hříšným a jinými odvětvími. Zatímco u společností operující v hříšném odvětví jako celku se neobjevují žádné významné rozdíly, bližší zkoumání jednotlivých odvětví v rámci triumvirátu hříchu odhaluje pozoruhodné rozdíly. U tabákových společností se vliv vztahu mezi výkonností ESG a finanční výkonností podniku v obou směrech jeví jako výrazně nižší než u ostatních odvětví. Naopak u výrobců alkoholických nápojů je vliv komplexnější, přičemž environmentální a sociální pilíř mají výrazně větší dopad na finanční výkonnost než u ostatních společností. Odvětví hazardních her nevykazuje při kontrole ostatních faktorů žádný významný efekt.

Klasifikace JEL	A13, G30
Klíčová slova	ESG skóre, finanční výkonost, kontroverzní odvětví, panelová VAR, Grangerova kausalita
Název práce	ESG skóre a finanční výkonnost společností v kontroverzních odvětvích
E-mail autora	`94650100@fsv.cuni.cz`
E-mail vedoucího práce	`jiri.kukacka@fsv.cuni.cz`

Acknowledgments

The author is especially grateful to PhDr. Jiří Kukačka, Ph.D., for valuable and useful suggestions, comments, patience with questions, time, and effort spent on consultations. The author would also like to thank her family and friends for their patience and support, not only during the writing of the thesis but also during the entire studies.

Typeset in FSV LaTeX template with great thanks to prof. Zuzana Havrankova and prof. Tomas Havranek of Institute of Economic Studies, Faculty of Social Sciences, Charles University.

Bibliographic Record

Jia Xin, Ji: *ESG score and corporate financial performance in controversial industries*. Bachelor's thesis. Charles University, Faculty of Social Sciences, Institute of Economic Studies, Prague. 2024, pages 84. Advisor: PhDr. Jiří Kukačka, Ph.D.

Contents

List of Tables

List of Figures

Acronyms

CSR Corporate social responsibility

CFP Corporate financial performance

CSP Corporate social performance

ESG Environmental, Social, and Governance

ESGC Environmental, Social, Governance Combined

KLD Kinder, Lydenberg and Domini

GMM Generalized method of moments

MMSC Model and moment selection criteria

BIC Bayesian information criteria

HQIC Hannan-Qiunn information criteria

AIC Akaike information criteria

VIF Variance inflation factor

LSEG London Stock Exchange Group

ROA Return on assets

ROE Return on equity

NIPS Net income per share

BVPS Book value per share

LTDTA Long term debt to assets

RDPS Research and development per share

EPS Earnings per share

VAR Vector autoregression

PVAR Panel vector autoregression

WHO World Health Organisation

FE Fixed effects

RE Random effects

OLS Ordinary least squares

Chapter 1

Introduction

In today's society, there is a growing expectation that companies not only deliver high-quality products and services but also consider their resource use and business practices. With growing awareness of environmental, social, and governance issues, consumers are looking at products and services through different lens. Companies are now exploring whether they can gain a competitive advantage by aligning themselves with nature-friendly practices. This could include actions such as contributing to climate change mitigation and biodiversity conservation. There is also a growing recognition that addressing societal challenges, such as supporting marginalized groups or reducing gender inequality, can also have a positive impact on a company's business and reputation.

A significant body of research has been devoted to exploring the relationship between CSR and the CFP, dating back to the work of Moskowitz (1972). However, there is no clear consensus regarding the nature or direction of this relationship. Recent meta-analyses suggest that the majority of studies report a non-negative relationship (Friede et al. 2015; Busch and Friede 2018). Despite this, the debate regarding the direction and sign remains inconclusive.

The inconsistency of research findings may stem from the diverse metrics used to measure CFP (accounting or market measures) and CSR. To address the need for standardized metrics for CSR, the introduction of ESG framework of three pillars has been instrumental. The 'E' stands for the environmental pillar, covering topics concerning climate change, pollution, water, biodiversity, and resource use (European Commission 2023). The 'S' represents the social pillar, with topics such as workers, communities, consumers, etc (European Commission 2023). The governance pillar, represented by 'G', stands for topics such as business conduct, relationships with suppliers, payments, protection

of whistleblowers, anti-corruption policies, etc (European Commission 2023). However, since there is no strict global definition of the topics covered by each pillar, ESG scores and ratings vary across data providers.

The topic is even more interesting in the field of controversial industries, such as tobacco, gambling, or alcohol. Companies operating in these industries face not only economic hurdles but also social stigma due to the health risks associated with their products and services (Novak and Bilinski 2018). Researchers are interested in exploring how this social stigma affects the ESG-CFP relationship compared to other industries. Given the non-negative relationship of ESG-CFP in other industries, there is interest in whether ESG engagement could serve as a way for companies in controversial industries to address their negative reputation and social stigma. However, despite the relevance of these questions, the literature on the ESG-CFP relationship within the controversial industries is still in its infancy, with only a few recent studies examining the topic.

The thesis contributes to the literature on the ESG-CFP relationship within controversial industries. It does so through a comparative analysis that contrasts the effects observed in sin industries with those in other sectors. Each industry within the triumvirate of sin (gambling, alcohol, tobacco) is examined in detail in terms of the ESG-CFP relationship from both causal directions. To the author's knowledge, such a detailed analysis is unprecedented in the academic literature. Furthermore, it contributes to the literature on ESG performance and CFP by providing a comprehensive examination of the sign and direction of the relationship. This is achieved through the use of PVAR methodology and Granger causality tests. The analysis is conducted using data from the London Stock Exchange Group (LSEG), an independent provider of financial and ESG data. The focus is on the U.S. companies listed in the S&P 500 index. These contributions offer valuable insights into the complex ESG-CSR relationship, particularly in controversial industries.

The thesis is structured as follows: Chapter 2 provides a historical overview of the CSR concept, examines selected studies on the sign of the ESG-CFP relationship, introduces the causality hypotheses, defines the controversial industry, and includes a discussion of ESG in controversial industries. Chapter 3 describes the data source used in the analysis, the variables, and presents the descriptive statistics of the dataset. Chapter 4 describes the methodology used in the thesis: PVAR, Granger causality testing, and the regression utilized for comparative analysis of ESG-CFP relationship in sin industries and other sectors.

Chapter 5 presents the empirical findings, together with tests of assumptions, robustness check, and limitations of the thesis. Finally, Chapter 6 summarises the findings and suggests potential modifications.

Chapter 2

Literature review

2.1 From Corporate Social Responsibility (CSR) to Environmental, Social, and Governance (ESG)

2.1.1 Brief historical development of the CSR concept and its definition

At the outset, numerous scholars attempted to define the concept of the CSR. One of the most influential figures in this regard is Archie B. Carroll. In his work Carroll (1999), he extensively explores the evolution and definition of the CSR concept.

The first official article addressing the CSR concept was written by Bowen (1953). In the article, he presents the opinion that modern businessmen should not solely focus on financial metrics, but also consider the consequences of their actions on society and the environment. Several scholars in the United States have followed Bowen's perspective, leading to works by Davis (1960); McGuire (1963); Walton (1967).

Nevertheless, not all reactions to Bowen's book were positive. Milton Friedman, a renowned economist known for his liberal views, disagreed with the concept of CSR. In his book *Capitalism and Freedom* (Friedman 1962) and subsequent article Friedman (1970a), he critically assesses the concept and argues that CSR poses a significant threat to the freedom of society. Davis (1973) later compares the views of two influential economists with contrasting perspectives on CSR: Paul Samuelson and Milton Friedman. Samuelson famously argued:

> *"A large corporation these days not only may engage in social responsibility, it had damn well better try to do so."*
>
> *Source: Samuelson (1971)*

An important milestone was the publication of *Social Responsibilities of Business Corporations* by Committee for Economic Development (1971). It highlighted a shift in consumer perspectives in the sense that the companies were being forced not only to meet consumer needs but also to contribute to the overall well-being of American society.

> *"Business is being asked to assume broader responsibilities to society than ever before and to serve a wider range of human values. Business enterprises, in effect, are being asked to contribute more to the quality of American life than just supplying quantities of goods and services."*
>
> *Source: Committee for Economic Development (1971)*

In the following two decades, the alternative terms Corporate social performance (CSP) and Corporate social responsiveness were first introduced by scholars, as the performance measures of companies concerning CSR. One of the major contributors to this discussion was the article by Sethi (1975), in which he presented three dimensions of CSP: *social responsiveness*, *social responsibility*, and *social obligation*. These dimensions vary in their nature, with some being prescriptive (specifying actions that companies take) or proscriptive (actions that companies should avoid)(Sethi 1975). For example, social obligations are proscriptive while social responsibilities are prescriptive.

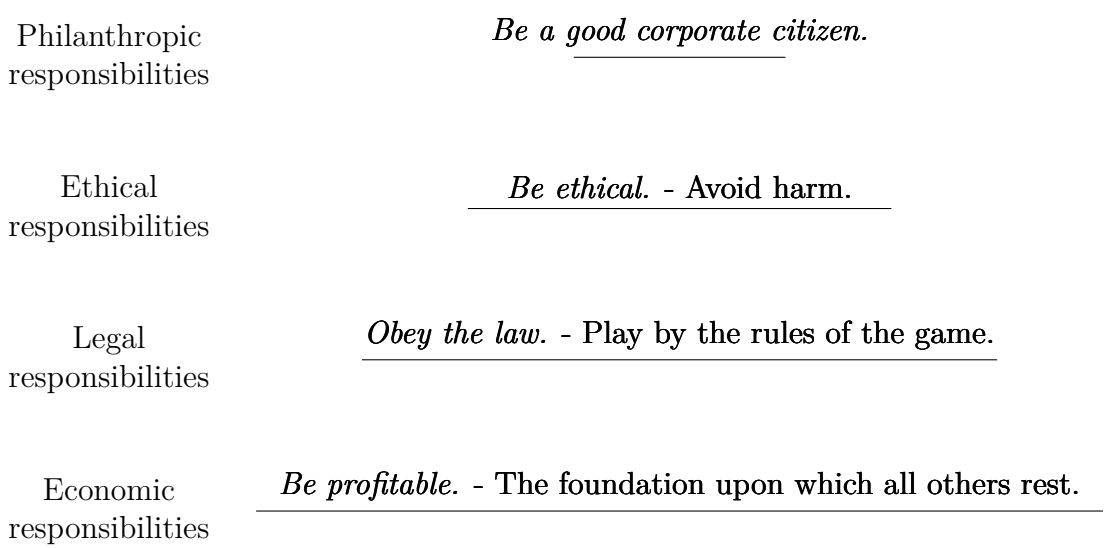
Another significant milestone was the introduction of the three-dimensional model (responsibilities, responsiveness, and social issues) of corporate performance introduced by Carroll (1979). Carroll proposed that the CSR definition should cover four categories of business responsibilities (discretionary, ethical, legal, and economic), each of which has a different importance.

Wartick and Cochran (1985) further explored the proposed model and suggested that CSR rests on the *principles* of corporate social responsibilities, *processes* of corporate social responsiveness, and *policies* of social issues. Building on this framework, Wood (1991) further develops three levels of CSR, the institutional level as *social legitimacy*, the organizational level as *public responsibility*, and the individual level as *managerial discretion*.

During the same year, Carroll revised his definition of CSR, renaming the *discretionary* category to *philanthropic* and introducing the term *corporate citizenship* (Carroll 1991). He defined a good corporate citizen as one who is

ethically and morally compliant with laws and actively engaged in improving the quality of life (Carroll 1991, p. 42). Carroll also introduced a graphical visualization of the four categories concept, known as the pyramid of CSR (Figure 2.1). At the base of the pyramid is the economic category, which highlights that primary objective of any company is to make a profit.

Figure 2.1: Carroll's pyramid of CSR



Source: Carroll (1991, p. 42), graphically modified

To briefly conclude all four stages of the pyramid, Carroll stated:

> *"Stated in more pragmatic and managerial terms, the CSR firm should strive to make a profit, obey the law, be ethical, and be a good corporate citizen."*
>
> *Source: Carroll (1991)*

The acceptance of the concept and definition of CSR increased significantly during the last decade of the last century. At the beginning of the new century, the term CSR became a new global phenomenon, gaining importance not only among scholars but also among multinational enterprises (Organization for Economic Co-operation and Development 2001).

A comprehensive review of the most commonly used definitions was summarized in the work of Dahlsrud (2008). The author examines the frequency of the most commonly used definitions from the internet search engine Google based on the five dimensions (*stakeholder, economic, social, environmental, voluntariness*). The study analyzed 37 definitions from 27 scholars spanning the period from 1980 to 2003. The definition ranked first was from *Commission of the European Communities* in 2001:

> *"A concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis"*
>
> *Source: Dahlsrud (2008)*

2.1.2 ESG

With the evolution of CSR, there was a need for a more quantitative approach to measure and compare CSR activities between companies. This led to the introduction of the ESG concept, a three-pillar approach to CSR. The term ESG first appeared in 2004 in a report consulted with 20 financial institutions in the United Nations, under the guidance of the *United Nations Global Compact* (United Nations Global Contact 2004). This marked the practical inception of ESG as a modern approach to CSR. For clarity, only the term ESG will be used in the following text.

2.1.3 Socially responsible investing

The evolution of socially responsible investing has a long history. Initially, it referred to an investing approach where personal social values played a more significant role in the decision-making than the financial factors (Derwall et al. 2011). Nevertheless, responsible investing has also developed as the ESG concept gained importance in the financial world. Nowadays, socially responsible investors take into account both financial considerations and non-financial concerns, such as moral, ethical, and environmental factors with equal importance (Benson et al. 2006).

2.2 Corporate financial performance (CFP) and ESG

Scholars are studying the relationship between the CFP and ESG, to help companies decide whether to allocate more or less of their budgets to ESG engagements. However, researchers are not yet able to provide a definitive answer. Empirical findings can be grouped based on the type of relationship observed (neutral, negative, positive, and other alternatives). Following section presents a selection of key studies from each group and Table 2.1 provides a summary of selected studies.

2.2.1 Positive link

The earliest article investigating the relationship between the CFP and ESG dates back to 1972 when Moskowitz compiled a list of 14 companies that he subjectively considered to be responsible and recommended them as potential investment opportunities. These companies were indeed observed to have outperformed various benchmarks, including the Dow-Jones Index, and Standard and Poors Industrials, six months after the article was published (Moskowitz 1972).

A more objective and robust approach was taken by Waddock and Graves (1997), who used more reliable data for measuring ESG commitment provided by rating agency Kinder, Lydenberg and Domini (KLD). This data included ESG scores composed of eight attributes of ESG, each weighted according to its significance. The authors found not only a positive ESG-CFP relationship but also a bilateral causality between them.

Using a matched sample of *high* and *low* sustainability companies in the US, Eccles et al. (2014) claim that the companies from the *high* group significantly outperform their counterparts in the long run.

2.2.2 Negative link

The first article to claim that the sign of the ESG-CSR relationship could also be negative was written by Vance (1975), who re-examined the list of 14 companies from Moskowitz (1972) using data from a different period (1972 to 1975). The result was completely opposite, with only one company on the list outperforming the benchmarks. The scholars argue that the inconsistency of results may be influenced by the small sample size (Abbott and Monsen 1979).

Further research by Hillman and Keim (2001) examined the different impacts of ESG engagement. They found that engagements with indirect impacts on primary stakeholders, such as customers, employees, etc., may lead to a reduction in shareholders' wealth.

Additionally, Makni et al. (2009) focused their research on Canadian companies and found a negative significant effect of the environmental pillar of ESG on CFP. They also discovered a unidirectional relationship between the environmental pillar of ESG to CFP.

2.2.3 Neutral link

Some studies have found no significant relationship between ESG and CFP. For instance, Alexander and Buchholz (1978) responded to the inconsistent results of Moskowitz (1972) and Vance (1975) by adjusting for the risk factor, which the previous authors did not control. His study, conducted on the same sample of 14 firms, found insignificant results, suggesting that both Moskowitz (1972); Vance (1975) may have been incorrect with their estimations and interpretations.

Similarly, Aupperle et al. (1985) also used a risk-adjusted variable as an indicator of CFP. They created a questionnaire for CEOs based on the four components of Carroll's pyramid as depicted in the Figure 2.1 (Carroll 1991). However, no significant relationship was indicated based on their model.

Another study, McWilliams and Siegel (2000) argues that models in previous studies may be biased due to the exclusion of research and development investment as a control variable, which is an important indicator of companies' profitability. After including this variable in the model, no significant relationship was found between the ESG-CSR.

2.2.4 Non-linear link: U-shaped

In addition to previous links, some authors have also found non-linear relationships between ESG-CSR. For example, Bowman and Haire (1975) conducted a study using the ratio of the number of lines in the annual reports that were devoted to socially responsible activities to the total amount of lines as a proxy for ESG activities. They discovered that companies with either low or high ratios tend to underperform companies with average ratios. The relationship is therefore curvilinear, graphically nicely displayable by the letter "U".

Barnett and Salomon (2006) also indicated a similar relationship in the fund market, observing the influence of social screens (excluding certain stocks based on their industry nature) on financial returns. The results suggest that as the number of social screens increases, financial performance decreases until it reaches a breaking point, after which it begins to rise.

Lastly, a similar study in the construction industry also showed a curvilinear relationship between ESG performance and CFP (Wang et al. 2016).

Table 2.1: Overview of selected studies

Relationship ESG - CFP	
Positive	Moskowitz (1972) Waddock and Graves (1997) Eccles et al. (2014)
Negative	Vance (1975) Hillman and Keim (2001) Makni et al. (2009)
Neutral	Alexander and Buchholz (1978) Aupperle et al. (1985) McWilliams and Siegel (2000)
U-shaped	Bowman and Haire (1975) Barnett and Salomon (2006) Wang et al. (2016)

2.2.5 Meta-analyses

Due to the mixed results of research on the ESG-CSR relationship, scholars have used meta-analysis as a method for summarising econometric studies. Influential meta-analyses on this topic include those by (Busch and Friede 2018; Friede et al. 2015; Orlitzky et al. 2003; Waddock and Graves 1997). They all conclude that there exists a non-negative link between ESG-CSR, based on the majority of empirical evidence. Friede et al. (2015) conclude over 2000 empirical studies, which have been published since the 1970s, suggesting that more than 90% of the studies find a non-negative ESG-CSR relationship.

2.2.6 Causality

Scholars also investigate the causal relationship between ESG-CSR. There are six possible theories about the direction according to Preston and O'bannon (1997). First, one should consider whether the ESG-CSR relationship is positive or negative. Secondly, the direction itself should be considered. The question is whether financial performance drives ESG performance, the other way around, or is it a bidirectional relationship. By combining these two dimensions six possible hypotheses emerge: managerial opportunism hypothesis, slack resource hypothesis, trade-off hypothesis, social impact hypothesis, and positive and negative synergy hypothesis. Table 2.2 summarises the hypotheses into a comprehensive table.

Slack resource hypothesis suggests that as a company's financial performance improves, it gains additional resources for socially responsible activities, resulting in better ESG scores (Preston and O'bannon 1997; Waddock and Graves 1997). Research supporting this theory dates back to the 1980s, when McGuire et al. (1988), using Fortune magazine's ratings, found that positive prior financial performance has a greater influence on the ESG than subsequent financial performance. Similarly, Scholtens (2008) found a similar outcome using data from a different provider, the KLD database. Furthermore, also Granger causality tests were conducted to confirm the direction of causality.

Managerial opportunism hypothesis proposes that some managers may seek to take advantage of better financial performance to prioritize self-reward over investments in ESG activities (Preston and O'bannon 1997). Furthermore, when faced with underperformance, managers may seek to use ESG investments to compensate for their weak performance (Preston and O'bannon 1997). A study that comes close to confirming this hypothesis is Moore (2001), which identified a negative relationship between current CFP to current ESG performance. Nevertheless, when lagged CFP was compared with ESG performance, a positive relationship was found.

Trade-off hypothesis suggests that an increase in ESG engagements will lead to lower financial performance, as the costs will outweigh the benefits and consequently reduce the wealth of shareholders (Waddock and Graves 1997). One of the most famous proponents of this hypothesis is Milton Friedman, who argues that the primary purpose of the organization is to generate profit. He sees ESG engagements as an unnecessary expenditure (Friedman 1970b). This perspective was supported in the study by López et al. (2007), who examined the Dow Jones Sustainability Index.

Social impact hypothesis proposes that meeting the desired needs of stakeholders regarding social responsibility will consequently lead to improved financial performance. Waddock and Graves (1997) confirmed that ESG performance and future financial performance are positively associated, utilizing data from the KLD database of the S&P 500.

The last two hypotheses claim, that there is a bidirectional relationship between ESG-CSR.

Positive synergy hypothesis suggests that an increased ESG engagement leads to an increase in CFP, which would allow for further investment in socially responsible actions. This positive ESG-CFP relationship could lead to the formation of a virtuous circle (Lin et al. 2019). Chollet and Sandwidi (2018) confirmed this relationship in the case of financial risk and ESG performance. Also, similar results were found in the previously mentioned meta-analysis of Waddock and Graves (1997); Orlitzky et al. (2003).

Negative synergy hypothesis proposes that higher levels of ESG engagement lead to lower financial performance, thereby limiting investment in socially responsible activities. This could lead to the creation of a vicious circle (Makni et al. 2009). However, it should be noted that this remains a rather theoretical hypothesis, as to the author's knowledge there is a lack of empirical research supporting the hypothesis.

The results are inconsistent, as discussed in the previous lines. These irregularities may arise due to variations in the data provider (KLD Research & Analytics Inc, Asset4, Fortune), as well as variations in the methodology (Granger causality, lagged Ordinary least squares (OLS), 2SLS, 3SLS, and PVAR). Such diversity in approaches underlines the complexity of the topic and presents an opportunity for further clarification.

Table 2.2: Summary of causality hypothesis

Direction	**Positive(+)**	**Negative(-)**
$CSR \rightarrow CFP$	Social impact	Trade-off
$CFP \rightarrow CSR$	Slack-resources	Managerial opportunism
$CSR \overset{\leftarrow}{\rightarrow} CFP$	Positive synergy	Negative synergy

Source: Lin et al. (2019), graphically modified

2.3 Controversial industry

2.3.1 Definition of controversial industry

The concept of "controversial" industries is derived from the marketing categorization of products by Wilson and West (1981, p. 92), which refers to:

> *"...products, services, or concepts that for reasons of delicacy, decency, morality, or even fear tend to elicit reactions of distaste, disgust, offence, or outrage when mentioned or when openly presented."*

In particular, advertising for products such as alcohol, birth control, cigarettes, contraceptives, and political advertising tend to cause controversy in the United States (Waller et al. 2005). In the early stages of research in this area in the 1980s and 1990s, terms such as "socially sensitive products" (Fahy et al. 1995), "unmentionables" (Wilson and West 1981), "offensive products" (Barnes Jr and Dotson 1990) or "controversial products" (Rehman and Brooks Jr 1987) were frequently used by scholars.

In the 2000s, scholars began to categorize industries that could be perceived as controversial into two main groups. The first group consists of industries that produce inherently contentious products, such as health- or sex-related products, tobacco, alcohol, gambling, and weapons (Kilian and Hennigs 2014). In essence, these are industries that may threaten cultural or social norms (Lindorff et al. 2012) or whose products are seen as addictive or have other unhealthy consequences (Du and Vieira 2012). Scholars differ in their terminology, with Byrne (2010) referring to this group as "unethical" while Fam and Waller (2003) uses the adjective "offensive".

The second group includes industries that conflict with general ethical, environmental, and social practices (Cai et al. 2012). However, the definition is unclear, leading scholars to include various industries in their analysis. These may range from mining (Jenkins and Yakovleva 2006) and biotechnology (Günther and Hüske 2015) to energy (Du and Vieira 2012) and cement production (Cai et al. 2012). Recent studies have expanded the scope of this definition to include the fast food sector in the analysis (Phillips 2011; Fabozzi et al. 2019), as numerous studies have highlighted its unhealthy consequences (eg. Bowman et al. 2004; Fleischhacker et al. 2011). Additionally, Rehman and Brooks Jr (1987) also include feminine hygiene products, contraceptives, or pregnancy tests as products from controversial industries. Nevertheless, it is crucial to note that opinions regarding controversial industries are highly subjective and vary across cultures (Waller et al. 2005) and religions (Fam et al. 2004).

Another commonly used term is the "triumvirate of sin", which consists of three industries: tobacco, gambling, and alcohol (e.g. Hong and Kacperczyk 2009; Chong et al. 2006; Fauver and McDonald IV 2014; Liu et al. 2014). There is no doubt about the sinful nature and unhealthy effects on human health of

the gambling and alcohol industries, as numerous studies confirm (Corrao et al. 2004; Roerecke and Rehm 2013; Hodgins et al. 2011; Raylu and Oei 2002).

However, the health consequences of tobacco were not well-known among researchers for a long time. The first publications came from physicians in the 1920s and 1930s who suspected a link between lung cancer and smoking (Musk and De Klerk 2003). It was not until 1950, with the completion of four major retrospective studies examining the smoking habits of lung cancer patients, that the negative effects of tobacco became clear (Doll and Hill 1950; Levin et al. 1950; Schrek et al. 1950; Wynder and Graham 1950). Additionally, two years later, the publication of the widely circulated article *Cancer by Carton* described in detail the various dangers of smoking, which led to a significant drop in smoking rates (Hong and Kacperczyk 2009). In response, tobacco companies published their own studies to convince society that smoking was not inherently "bad" (Hong and Kacperczyk 2009). In the 1960s, a special committee was formed to focus specifically on research into smoking and its effects on health (Hong and Kacperczyk 2009). In 1964, they published an extensive report of more than 385 pages describing in detail the causal link between cigarette smoking and lung cancer (United States Surgeon General's Advisory Committee on Smoking and Health 1964), which is sometimes considered a turning point for the tobacco industry (Housman 2001; Hong and Kacperczyk 2009). As a result of an extensive body of research confirming the negative health consequences of smoking, the vast majority of society now regards tobacco products as sinful.

At the end of 2023, the World Health Organisation (WHO) launched a new campaign titled "Stop the lies" to combat disinformation and other manipulative practices used by tobacco companies (World Health Organization 2023a). Using the catchy hashtag "#tobaccoexposed", the campaign aims to make the manipulative tactics of these companies more transparent, with the goal to protect young people and future generations by urging governments to implement policies that ensure a better future (World Health Organization 2023b). The recent introduction of new product lines of e-cigarettes with different flavors, such as menthol, fruits, and also desserts like apple pie, and ice cream, are primarily targeted at the younger generation. Therefore, WHO recognizes a significant need to educate them about these practices (Hsu et al. 2018). Scholars have already conducted studies on the health implications for this particular generation and have found not only negative health consequences (Leventhal et al. 2015) but also an increased likelihood of using other tobacco products in

the future (Soneji et al. 2017).

2.3.2 Sin stocks

While socially responsible investing has been extensively researched, the study of its opposite, socially irresponsible investing, has not received the same level of attention (Chong et al. 2006; Derwall et al. 2011). This research focuses on "sin stocks", typically stocks of companies in industries within the "triumvirate of sin" or other controversial sectors. The primary research revolves around whether socially responsible investors who prioritize stocks with high ESG ratings achieve better financial outcomes compared to investors who focus primarily on sin stocks ("vice investors").

According to asset pricing theory by Fama (2007), socially responsible stocks with higher ESG scores tend to be overvalued by socially responsible investors, who simultaneously undervalue sin stocks (Lobe and Walkshäusl 2016). Conversely, vice investors tend to overweight sin stocks and underweight their socially responsible counterparts (Lobe and Walkshäusl 2016). However, it is still unclear whether this theory holds true in practice. The vast majority of studies indicate that vice investors actually outperform common benchmarks (e.g Fabozzi et al. 2008; Chong et al. 2006; Salaber 2009). Some studies, however, have reported contradictory results (Shank et al. 2005) or insignificant findings (Lobe and Walkshäusl 2016).

One of the pioneering studies on this topic comes from Luck and Wood (1992), who empirically examined the performance of sin stocks and concluded that alcohol and tobacco stocks outperformed socially responsible stocks, while the effect on gambling stocks was insignificant. An influential article by Hong and Kacperczyk (2009) suggests that sin stocks significantly outperform the common benchmarks, such as the S&P 500 index. They argue that the low institutional ownership may be one of the reasons, as the reduced risk-sharing could lead to abnormal returns. Other factors mentioned by the authors include infrequent coverage by the analysts and higher litigation risk, which subsequently increases expected returns.

Fabozzi et al. (2008) compared sin portfolios to common benchmarks and found that sin portfolios significantly outperformed the benchmarks. Blitz and Fabozzi (2017) proposed an explanation for this "sin stock anomaly", suggesting that the two pricing factors (investment and profitability) from the new five-factor asset pricing model of Fama and French (2015) explain the anomaly.

When controlling for these factors, no additional return premium persists (Blitz and Fabozzi 2017).

Fabozzi et al. (2019) suggest a different scenario when comparing bonds, with sin bonds being overvalued and their counterparts consequently outperforming them. The results imply an interesting duality as sin stocks tend to be undervalued while sin bonds are overvalued (Fabozzi et al. 2019).

Various studies have examined important characteristics that may influence the valuation of sin stocks. Salaber (2009) investigated whether the economic cycle affects the sin stock anomaly. Her results suggest that sin stocks exhibit higher return premiums even during economic recessions. Culture also plays a significant role, with sin stocks being overvalued in the less individualistic cultures, leading to underperformance relative to their counterparts (Durand et al. 2013). Using the same logic, Fauver and McDonald IV (2014) suggest that nations with different social norms lead to different outcomes in terms of sin stocks. Furthermore, gender also has an impact, as women tend to have a higher aversion to sin stocks than men, which may influence the valuation of sin stocks and bonds (Niszczota and Białek 2021).

2.4 ESG in controversial industries

Previous sections provide evidence about ESG and its impacts on the CFP is far from settled. The story is even more interesting when we look at industries that are controversial and therefore face the additional challenge of social stigmatization (Novak and Bilinski 2018). Researchers are examining whether a company that manufactures products harmful to the environment, society, and humanity is still socially responsible and can effectively combat the never-ending moral debates and social taboos by engaging in ESG initiatives.

2.4.1 The contradiction

Due to the increasing awareness of ESG, companies operating in controversial industries are also striving to align themselves with ESG principles. However, they face additional challenges due to the nature of their industry, including social stigmatization. Executives in these companies are compensated for representing a firm in the controversial industry, as they may have a lower probability of securing a director position in other companies due to their lower social status (Novak and Bilinski 2018). Despite the efforts, companies in controversial in-

dustries often struggle to fully meet the social, environmental, and governance expectations of stakeholders, resulting in an illegitimate image (Palazzo and Richter 2005; Campbell 2007). Therefore, ESG engagements could be viewed as a way for these firms to improve their reputation (Yoon et al. 2006; Palazzo and Richter 2005).

2.4.2 Proponents

On the one hand, proponents of ESG in controversial industries argue that these companies have the right to utilize ESG to improve their reputation and that they possess the same freedom of choice in business strategy as the other firms (Cai et al. 2012). According to Jo and Na (2012) ESG engagements reduce firm risk. They discovered that the risk-reduction impact was more evident in the controversial industry compared to its counterparts. Additionally, De Roeck and Delobbe (2012) found that various ESG activities support better relationships between employees and strengthen their sense of belonging to the organization, both in the oil industry and other sectors. Yani-de Soriano et al. (2012) suggest that the gambling sector can enhance its desired legitimacy by complying with the legal and ethical requirements.

2.4.3 Opponents

On the other hand, opponents argue that there should be strict regulations to control the ESG activities of companies operating in controversial industries (Cai et al. 2012). The WHO promotes the idea that the tobacco industry is *inherently contradictory* to any ESG activity due to its negative impact on human health (World Health Organization 2004). Specifically, they oppose any ESG actions for companies in the tobacco industry, as one should prioritize health above everything (United Nations Economic and Social Council Ad Hoc Inter-agency Task Force on Tobacco Control 2008).

Palazzo and Richter (2005) assert that mistrust of controversial industries is not only due to the harmful nature of their products but also to their manipulative actions and disinformation about the health consequences. They argue that common ESG activities, such as self-regulation, ESG reporting, or stakeholder philanthropy can even have counterproductive results. For instance, studies of youth smoking prevention programs financed by major tobacco companies have shown no significant reduction in smoking rates among young people (Landman et al. 2002). Moreover, there is evidence suggesting that these programs

have helped tobacco companies with taxes and marketing restrictions, effectively maintaining positive public relations with policymakers and educational authorities while deflecting regulation (Farrelly et al. 2002; Landman et al. 2002). Fortunately, these hidden agendas are already being recognized by governments and policymakers, making it more challenging for these companies to operate in this way.

2.4.4 Research

Research on ESG performance in controversial industries is still in its early stages, with several important contributions in recent years.

Grougiou et al. (2016) investigate the ESG reporting practices of companies operating in controversial industries, using a matched sample of similarly sized non-controversial companies as a benchmark. Their findings indicate that the companies operating in controversial industries exhibit greater activity in ESG disclosures compared to the benchmark. The authors suggest that such disclosures may serve as a means to mitigate negative stigmatization and potentially distract from the negative impacts of their core activities.

Cayón and Gutierrez (2021) examine the relationship between ESG performance and share prices of companies operating within sin industries. Their research shows a positive correlation between ESG performance and future ESG performance of sin stocks.

Building on these findings, Du and Sun (2023) conduct an extended analysis of the ESG-CSR relationship within sin companies. Using three different non-sin benchmark groups, they find that, on average, sin companies have higher ESG scores than benchmark companies.

Despite these efforts, there is still a lack of clear understanding regarding the intentions, means, and impacts of ESG activities on firms in controversial industries. This thesis tries to contribute to this area of research and examines the causal link between ESG-CSR and its effects on companies in controversial industries.

Chapter 3

Data

3.1 ESG score calculation

The LSEG's ESG database covers more than 15,500 public and private companies worldwide, with data available since 2002, making it one of the most comprehensive databases of ESG scores (LSEG Data & Analytics 2023). Detailed guidance on the methodology used to calculate the ESG scores is provided annually by LSEG, with the following information taken from the most recent report from December 2023 (LSEG Data & Analytics 2023).

LSEG's approach to ESG calculation is based on the 10 category subscores (Table 3.1), which are weighted according to the importance of each category within a particular industry, assessed on a simple scale of 1 to 10. Notably, the weight of the governance pillar remains unchanged across all industries.

Additionally, to address the bias that may arise from controversies reported in global media, an ESG controversies score is calculated. This score covers 23 ESG controversies, that may have occurred during the examined year and may have harmed the company. A company receives a full ESG controversies score of 100 if no controversies occurred during the year. This metric aims to capture the differences in company size, as large companies tend to attract more media attention than smaller ones.

Moreover, the ESGC score incorporates both of the previously mentioned scores. If the ESG controversies score is higher than the ESG score (indicating either that the company was not involved in ESG controversies or the impact was minimal), the ESGC score equals the ESG score. Conversely, suppose the ESG score is greater than ESG controversies score (indicating a significant impact of

Table 3.1: ESG pillars and categories

Pillar	Category
Environmental	Resource use
	Emissions
	Innovation
Social	Workforce
	Human Rights
	Community
	Product responsibility
Governance	Management
	Shareholders
	CSR Strategy

Note: Table shows three pillars of ESG and respective categories used in the calculation of the ESG score of LSEG.
Source: LSEG Data & Analytics (2023)

ESG controversies). In that case, the ESGC score is calculated as the weighted average of the two scores (ESG score, and ESG controversies score).

3.2 Inconsistency of results

Based on the Chapter 2, it is clear that the findings regarding the sign of the ESG-CFP relationship, as well as on the causality question, are inconsistent. Allouche and Laroche (2005) suggest that this lack of consistency may stem from differences in the sample (such as sample size and cross-sectional disparities) and diverse methods used to measure ESG and CFP (market-based or accounting-based).

Researchers differ in their choice of metrics to measure CFP. Some opt for accounting-based measures, such as Return on equity (ROE), Return on assets (ROA), or net income derived from the companies' financial statements. Conversely, some choose market-based measures such as stock returns and Earnings per share (EPS). The key difference is that accounting-based indicators may be backward-looking and subject to managerial manipulation (Havlinova and Kukacka 2023). Also, the market-based metrics are restricted only to publicly listed companies (Galant and Cadez 2017). Additionally, some scholars include a combination of both types of measures in their model or directly use variables such as Tobin's Q (market value divided by total assets) or MVA

(market value minus book value of equity and debt), which combines both market-based and accounting measures (Galant and Cadez 2017).

CSR measurements also vary, as the definition of CSR is not strictly defined. Chatterji et al. (2009) suggest that the divergence of ESG ratings has two major causes: what categories they include and the consistency of measurement. Berg et al. (2022) extend the idea and decompose the divergence into three possible factors: measurement, scope, and weight. Using ESG ratings from six different independent providers (MSCI, Refinitiv, S&P Global, Moody's ESG, Sustainalytics, and KLD) they find that measurement plays the most important role in the divergence. Furthermore, the *rater effect* was observed, whereby agencies tend to give a company a higher score in one category then the likelihood of it receiving a higher score in the other category is also higher.

The quality of reported ESG data can also play a significant role. Therefore, with the increasing emphasis on standardizing ESG reporting practices worldwide, more accurate results could be achieved (Galant and Cadez 2017). The first steps have been taken in the European Union, as European Sustainability Reporting Standards are already applicable to large public interest companies with more than 500 employees to include non-financial reports together with the financial report as part of their annual reports. The regulation will gradually come into force in the next few years (EU Commission 2023). However, a recent study by Christensen et al. (2022) found evidence that greater ESG disclosure standardization leads to even greater discrepancies in ESG ratings between agencies. The authors suggest that the inconsistency may be due to the early stages of ESG disclosure standardization.

3.3 Variables

The main variables in our econometric models are the annual ESGC scores of companies and their share prices, as measures of companies' ESG engagement and CFP, respectively. Additionally, control variables for various company characteristics are included in the estimation of the ESG-CFP relationship in controversial industries. ESG performance may be strongly influenced by company size, as larger companies tend to invest more not only because they have a larger budget, but also due to the higher level of public pressure they face (Van der Laan et al. 2008; Havlinova and Kukacka 2023; Siegel and Vitaliano 2007). Therefore, the natural logarithm of the total assets of the company (log_Assets) is used to control for the size. It is also necessary to control for the

profitability of the firms, using variables such as Book value per share (BVPS), ROA, Net income per share (NIPS), and ROE.

The importance of controlling for risk has been highlighted by various scholars (Vance 1975; Aupperle et al. 1985), therefore the variable Long term debt to assets (LTDTA) is included in the model as a proxy for risk. McWilliams and Siegel (2000) highlights the importance of controlling for investment in research and development as another important measure of firm health. Due to unreported Research and development per share (RDPS) in the sample, which would lead to a significantly smaller dataset if these unreported observations were excluded, RDPS_adjusted (the missing values were calculated as 0.5% of companies revenue) and RDPS_zero (missing values were replaced with zero) were calculated to deal with the issue similarly to Havlinova and Kukacka (2023). Furthermore, for the analysis of each pillar (environmental, social, and governance) three variables indicating the score for each pillar were included (E_score, S_score, G_score).

There has been some discussion about the interpretation of BVPS. Companies with a negative BVPS are often said to suffer from financial pressure, typically signaled by negative earnings, suggesting potential difficulties in the future. In the past, scholars used to exclude these observations, as they were rare (Fama and French 1993; Griffin and Lemmon 2002). However, more recent studies have found an increasing trend of negative BVPS reports (Jan and Ou 2012). Furthermore, many of these companies are not in financial distress or reporting negative earnings. Possible explanations suggested by Luo et al. (2021) include goodwill impairment, when the carrying value differs significantly from its fair value, and temporary capital shortages (for example, start-up companies may report negative BVPS despite having strong growth potential). The observations with negative BVPS are kept in the dataset to not lose a third of the observations. However, the coefficients should be interpreted with caution.

Furthermore, when examining companies in sin industries, a dummy variable *Sin* was included in the dataset. Scholars have largely followed the approach of Hong and Kacperczyk (2009), one of the first to identify sin firms empirically. Hong closely follows the industry group identification of Fama and French (1997), identifying industry group 5 (tobacco products) with SIC codes 2100-2199 and industry group 4 (alcoholic beverages) with SIC codes 2080-2085. As the gaming industry does not have its own specific industry group, Hong and Kacperczyk (2009) utilize the NAICS codes: 7132, 71312, 713210, 71329, 72112, 721120. Companies that meet one of these criteria are identified

as sin firms in the dataset. Additionally, in order to estimate the individual effects of each industry more precisely, three separate dummies (alcohol, tobacco, gaming) are included in the dataset to indicate each industry in the triumvirate of sin industries.

Table 3.2: Variable explanations

Variable	Explanation
Share price (USD)	Closing stock price of the company
ESGC score (0-100)	ESG combined score, calculated as ESG score adjusted of controversies
E_score (0-100)	Score of E-pillar
S_score (0-100)	Score of S-pillar
G_score (0-100)	Score of G-pillar
NIPS (USD)	Net income per share = net income after tax/common shares outstanding
BVPS (USD)	Book value per share = book value of equity/common shares outstanding
ROE (%)	Return on equity
ROA (%)	Return on assets
LTDTA (USD)	Long term debt to assets = long term debt/total assets
Assets (USD)	total assets
RDPS_zero (USD)	Research and development per share, missing observations substituted with 0
RDPS_adjusted (USD)	Research and development per share, missing observations substituted with 0,5% of revenue
Sin	Dummy variable equal to 1 if the company operates in the sin industry
Gambling	Dummy variable identifying companies operating in the gambling industry
Alcohol	Dummy variable identifying producers of alcoholic beverages
Tobacco	Dummy variable identifying companies operating in the tobacco industry

Note: Table reports definitions and formulas of variables used in the thesis.

3.4 Source of data

Access to the necessary data was provided through student access granted by the Institute of Economic Studies at Charles University in Prague. Specifically, the LSEG database, formerly known as Refinitiv, was used. Financial data and ESGC scores for companies listed in the S&P 500 were acquired using the Microsoft Excel add-in Eikon Datastream. It is important to note that there are restrictions on the availability of these data, which have been used under license for this thesis. Access to the data may be granted upon reasonable request and with the permission of LSEG. Initial data preparation was performed in the environment of Microsoft Excel, while data analysis, including model estimation, was carried out using the R programming language within the RStudio environment.

3.5 Descriptive statistics

During the analysis, two distinct datasets were used. The first dataset was utilized to examine the sign and direction of the ESG-CFP relationship. It consists of the annual share prices of companies in the S&P 500 index together with the ESGC scores and individual scores for each ESG pillar. This dataset covers the period from 2002 to 2023.

Table 3.3: Descriptive statistics of the dataset utilized for testing of the direction of the causality relationship ESG-CFP

Variable	Mean	Median	St.Dev.	Max	Min
Share price (USD)	84.36	49.82	166.73	5908.87	0.94
ESGC_Score (0-100)	47.63	47.03	18.62	92.63	0.60

Note: Table presents descriptive statistics of the dataset used in the PVAR model and the Granger causality test to examine the sign and direction of causality of the ESG-CFP relationship. The dataset is an unbalanced panel data with N = 8281 observations covering the period 2002-2023.

The descriptive statistics of this dataset are presented in Table 3.3. The remarkably high standard deviation of share prices is unsurprising given the diverse composition of companies included in the dataset. The ESGC score, centered at 47, follows approximately the normal distribution (Figure A.1).

The second dataset is used for the regression model exploring the ESG-CFP relationship for companies operating in controversial industries. Similar to the first dataset, it includes constituents of the S&P 500 index. Stock prices, control variables (NIPS, BVPS, ROE, LTDTA, log_Assets, ROA, R&D), and ESG-related variables (ESGC score, E_score, S_score, G_score) are included in this dataset. As many scholars argue that the financial crisis may have influenced the role and impact of sustainability issues on companies, the period of the second dataset was adjusted accordingly (Giannarakis and Theotokas 2011; Karaibrahimoglu 2010; Chintrakarn et al. 2021). It covers the period from 2009, after the financial crisis, to the last complete data available in 2023. This assumption is subsequently tested in the Section 5.5.

Table 3.4 shows the descriptive statistics of the second dataset. Similar to the first dataset, the sample consists of diverse companies, which leads to considerable variation in the share prices, as indicated by the large standard deviation. Notably, the median value of RDPS_zero is 0, indicating the presence of

Table 3.4: Descriptive statistics of the dataset utilized for the regression concerning the ESG-CFP relationship in controversial industries

Variable	Mean	Median	St.Dev.	Max	Min
Share price (USD)	85.62	57.28	113.97	2348.45	1.37
NIPS (USD)	0.76	0.61	2.03	28.42	-52.29
BVPS (USD)	6.20	4.34	26.19	437.12	-508.13
ROE (%)	8.59	3.74	140.39	7956.32	-1742.86
LTDTA (USD)	0.25	0.24	0.16	0.91	0
Assets (USD)	3.74e+10	1.52e+10	8.85e+10	1.46e+12	1.64e+8
ROA (%)	1.59	1.44	3.08	31.40	-66.31
RDPS_zero (USD)	0.20	0	0.47	11.33	-0.16
RDPS_adjusted (USD)	0.24	0.07	0.46	242.65	-0.16
ESGC_Score (0-100)	52.02	52.13	17.72	92.72	1.90
E_Score (0-100)	50.13	55.42	27.71	98.55	0
S_Score (0-100)	59.06	60.80	20.86	98.12	0.26
G_Score (0-100)	58.66	61.24	20.94	99.46	0.70

Note: Table presents the descriptive statistics of the dataset used in the comparative analysis of the ESG-CFP relationship in controversial and non-controversial industries. The dataset consists of unbalanced panel data with a total of 5372 observations covering the period 2009-2023.

many companies with unreported RDPS in the sample, which were consequently adjusted by filling with zero. Of particular interest is the minimum value of RDPS, which is negative and close to zero. This anomaly occurs in cases where the research and development expenditure of discontinuous operations (such as divested operations) exceeds those from the continuous operations, resulting in negative research and development investments. In the full sample, there were only 12 observations with negative RDPS, which were retained in the sample, as their economic interpretation remains meaningful.

Furthermore, to mitigate potential outlier bias, two clear outliers (Berkshire Hathaway Inc and NVR Inc) were excluded from the dataset. The identification of potential outliers was based on the absolute value of the z-score of all variables, exceeding 3, following the rule of thumb. These observations are more than 3 standard deviations away from the mean. From the list, these two clear outliers were identified as they appeared multiple times as outliers across different variables and more than a third of their observations were identified as outliers. Consequently, they were excluded from the dataset to ensure the robustness of the results.

Chapter 4

Methodology

4.1 PVAR

To estimate the Granger causality in panel data, the PVAR model must be estimated at first. The foundation of the PVAR model lies in Vector autoregression (VAR). In 1980, Christopher Sims introduced the VAR method to macroeconomics and applied it to analyze the response of the economy to government policies in the United States (Sims 1980). His groundbreaking work in empirical research on cause and effect in macroeconomics earned him the Nobel Prize in 2011 (Nobel Prize Outreach 2023). The VAR model is derived from the autoregressive models commonly used in time series analysis, where variables are regressed on their past values. This statistical approach enables forecasting based on historical data.

The VAR model could be described as an autoregressive model operating in a multivariate space. It represents a system of equations in which the variables are regressed on the lagged values of each other (Holtz-Eakin et al. 1988). In VAR models, all variables are treated as endogenous (Love and Zicchino 2006). They were originally proposed as an alternative to multivariate simultaneous equation models, which often imposed strict identification restrictions (Sims 1980). Sims (1980) advocated for VAR models, emphasizing their non-theory based estimation approach. This type of model has traditionally been used in the field of macroeconomics due to the availability of long-time series data (such as GDP, unemployment, etc.). The use of VAR has increased significantly, not only in the field of macroeconomics but also in various fields analyzing time series data.

In the field of panel data estimation, Holtz-Eakin et al. (1988) introduced

PVAR model, which proposed the application of VAR models to panel data. Panel data typically cover shorter time periods compared to time series data and exhibit heterogeneity between individual observations. Therefore, it is not recommended to use the standard time series VAR approach when estimating panel data (Holtz-Eakin et al. 1988). PVAR combines two approaches (VAR and panel data estimation), as it treats all variables as endogenous while allowing for individual heterogeneity, which is often unobserved.

A general k-variate PVAR model of order p proposed by Abrigo and Love (2016):

$$Y_{it} = Y_{it-1}A_1 + Y_{it-2}A_2 + ... + Y_{it-p+1}A_{p-1} + Y_{it-p}A_p + X_{it}B + u_i + e_{it} \quad (4.1)$$

with subscripts: $i \in \{1, 2, ..., N\}, t \in \{1, 2, ..., T_i\}$,where:

- X_{it} represents a $(1 \times l)$ vector of independent variables for i-th individual at time t.
- Y_{it} represents a $(1 \times k)$ vector of dependent variables for the i-th individual at time t.
- u_i represents a $(1 \times k)$ vector of dependent variable-specific panel fixed effects. It captures unobserved effects that are specific for each individual in the sample but constant over time.
- e_{it} represents a $(1 \times k)$ vector of idiosyncratic errors. It covers unobserved factors that affect dependent variables which vary across time and also individual.
- $A_1, A_2, \ldots, A_{p-1}, A_p$ represents a $(k \times k)$ matrix of autoregressive parameters.
- B represents a $(l \times k)$ matrix with coefficients of independent variables.

The authors also assume three characteristics of idiosyncratic errors:

- $E(e_{it}) = 0$: There is no systematic bias in the errors.
- $E(e_{it}e'_{it}) = \Sigma$: The covariance matrix Σ denotes the covariance structure of errors across different variables and time.
- $E(e_{it}e'_{it}) = 0$ for all $t < s$: The idiosyncratic errors are uncorrelated for the same individual across different time periods.

Fixed effects specific to each panel account for the systematic cross-sectional heterogeneity. The above model could be estimated using OLS or with fixed effect methodology (Abrigo and Love 2016). The authors suggest using Generalized method of moments (GMM) estimation, as it provides consistent and efficient PVAR estimation. Furthermore, using the Wald test, the Granger causality could also be tested.

It is crucial to address the selection of the optimal order of lags. Andrews and Lu (2001) introduced Model and moment selection criteria (MMSC) specifically tailored for GMM estimation. The MMSC relies on the J test statistic, commonly used to test for over-identifying restrictions in GMM estimation. It works in the similar way to other well-known model-selection criteria, such as Bayesian information criteria (BIC) from Schwarz (1978), Hannan-Qiunn information criteria (HQIC) proposed by Hannan and Quinn (1979) or Akaike information criteria (AIC) by Akaike (1969). When applying MMSC to the GMM estimator, we arrive at the following criteria that should be minimized.

$$MMSC_{AIC,n}(k,p,q) = J_n(k^2p, k^2q) - 2k^2(|q|-|p|)$$

$$MMSC_{BIC,n}(k,p,q) = J_n(k^2p, k^2q) - (|q|-|p|)k^2ln(n)$$

$$MMSC_{HQIC,n}(k,p,q) = J_n(k^2p, k^2q) - Rk^2(|q|-|p|)ln(ln(n)), R > 2,$$

where the J statistics of overidentifying restriction ($J_n(k,p,q)$) of k-variate PVAR model of order p and moment conditions based on q lags of the dependent variables with sample size n (Abrigo and Love 2016).

The regression model is inspired by the article of Lin et al. (2019), which examines the causality of the ESG-CFP relationship using PVAR methodology. The authors examine two directions: first, if the ESG drives future CFP, and second, if CFP drives future ESG performance. In the first direction, the ESG performance of period *t-1* is associated with the CFP measure of period *t*, consistent with the social impact or trade-off hypothesis. This approach examines how current ESG performance affects future financial performance.

Model 1: ESG performance influences CFP of the subsequent period.

$$CFP_{it} = \beta_0 + \beta_1 CFP_{it-1} + \beta_2 ESG_{it-1} + u_i + e_{it,i=1,2,...,N;t=1,2,...,T} \tag{4.2}$$

The opposite direction suggests that the ESG score of the year t is associated with the CFP measure of the year *t-1*, following the slack resources and

managerial opportunism hypothesis.

Model 2: CFP influences ESG performance in the subsequent period.

$$ESG_{it} = \beta_0 + \beta_1 CFP_{it-1} + \beta_2 ESG_{it-1} + u_i + e_{it,i=1,2,...,N;t=1,2,...,T} \tag{4.3}$$

In both models, CFP_{it} and ESG_{it} represent the CFP and ESG performance for the i-th individual at time t, respectively. The CFP_{it-1} and ESG_{it-1} represent the CFP and ESG performance for the i-th individual at time *t-1*. u_i and e_{it} are the unobserved and idiosyncratic error terms. Both equations represent the case of the first order of lags, with higher order lags following a similar logic.

4.2 Granger causality test

The following section is based on the comprehensive article of Lopez and Weber (2017). For analysis of causal relationships, Granger (1969) introduced a model within the framework of time series estimation. Assuming y_t and x_t as stationary time series:

$$y_t = \alpha + \sum_{j=1}^{m} \delta_j y_{t-j} + \sum_{j=1}^{m} \beta_j x_{t-j} + \epsilon_t \tag{4.4}$$

with $t = 1, ..., T$, where α represents the intercept, δ_j represents coefficients of autoregressive parameters, β_j represents coefficients of independent variables, and ϵ_t denotes the error term.

The causality test assesses whether the variable x Granger causes y. The core concept of the test is to examine whether lagged values of x have significant coefficients when included in the regression alongside lagged values of y. The significance indicates the influence of x on the value of y. The rejection of the null hypothesis:

$$H_0 : \beta_1 = ... = \beta_m = 0$$

implies that x Granger causes y. Similarly, the opposite direction of the causality could be examined, by interchanging x for y:

$$x_t = \alpha + \sum_{j=1}^{m} \delta_j x_{t-j} + \sum_{j=1}^{m} \beta_j y_{t-j} + \epsilon_t \tag{4.5}$$

with $t = 1, ..., T$.

In the context of panel data, Dumitrescu and Hurlin (2012) introduces a

modified model:

$$y_{i,t} = \alpha_i + \sum_{j=1}^{m} \delta_{ij} y_{i,t-j} + \sum_{j=1}^{m} \beta_{ij} x_{i,t-j} + \epsilon_{i,t} \tag{4.6}$$

with $i = 1, ..., N$ and $t = 1, ..., T$, where α_i represents the intercept of i-th individual, δ_{ij} represents autoregressive parameters of the i-th individual, β_{ij} represents the coefficient of the independent variable of i-th individual, and $\epsilon_{i,t}$ denotes the error term.

In the settings of the regression, $x_{i,t}$ and $y_{i,t}$ denote variables for specific individual i for period t. The null hypothesis of no causality across all individuals follows the logic of Granger (1969). As $\forall i = 1, ..., N$:

$$H_0 : \beta_{i1} = ... = \beta_{im} = 0 \tag{4.7}$$

It is important to note that the alternative hypothesis should allow the presence of non-causality for some individuals. To deal with this, Dumitrescu and Hurlin (2012) suggest estimating regressions for each individual Equation 4.6 and performing the F-test to test the null hypothesis Equation 4.7 to obtain the Wald statistic for each individual W_i. Next step is to compute the mean of the individual W_i's, calculated as $\bar{W}_i = \frac{1}{N} \sum_{i=1}^{N} W_i$. This approach allows the Granger causality test to be conducted on the panel level, meaning that the rejection of the null hypothesis of no causality does not exclude the possibility that the Granger causality may not be observed in some panels (Lopez and Weber 2017).

The null hypothesis (Equation 4.7) is tested using the standardized statistic $\bar{Z}$ and the approximated standardized statistic $\tilde{Z}$, which assume independently identically distributed Wald statistics W_i. In the case of $\bar{Z}$ or $\tilde{Z}$ exceeding the standard critical values, the null hypothesis should be rejected in favour of the alternative, implying the presence of causality. The authors further advise that $\bar{Z}$ should be favored when dealing with panel data covering a long period of time with a large sample of individuals. In the case of a short time period, $\tilde{Z}$ should be preferred. Furthermore, the order of lag is also important. Scholars often align the number of lags estimated for PVAR to ensure consistency and reliability in the analysis.

4.3 Controversial industry ESG-CFP

For the comparative analysis of the ESG-CFP relationship in sin industries versus non-sin industries, an unbalanced panel dataset is utilized. In such datasets, Random effects (RE), pooled OLS, and Fixed effects (FE) estimators are commonly used methods for model estimation.

The advantage of RE and FE estimators is that they allow for the presence of individual heterogeneity, the unobserved effect that is invariant over time, commonly denoted as u_i. The presence of individual heterogeneity introduces a potential bias known as heterogeneity bias. This occurs when the assumption of no correlation between the independent variables and the disturbance is violated, as certain unobserved variables are not specified in the regression model and are thus included in the error term (Wooldridge 2012).

The FE and RE estimation use the concept of time-demeaned data to address individual heterogeneity by subtracting individual means from each observation and then using pooled OLS for estimation. The main difference between RE and FE models lies in the assumption regarding the correlation of individual effects and the regressors (Wooldridge 2012). The RE model assumes that the individual effects are uncorrelated with the regressors, whereas the FE model does not make this assumption. Another difference is that RE models also allow for the estimation of independent variables that are invariant over time. The choice between the models is usually guided by the Hausman test.

It is important to note that first difference estimation is an alternative to FE estimation, as the unobserved effect u_i is also removed. The idea of this alternative estimation is to differentiate the data over time for each panel. Specifically, the value of the observation at time *t-1* is subtracted from the value of the observation at time t (Wooldridge 2012).

The comparative analysis aims to investigate the ESG-CFP relationship between companies in sin industries compared to those in other industries. To indicate sin companies, a dummy variable *Sin* has been introduced into the dataset. This variable remains constant over time for each panel, as companies usually do not suddenly switch between industries.

Due to this time-invariant variable, FE and first differentiation methods could not be used for the estimation. Although RE estimation allows the inclusion of time-invariant variables, it can lead to inconsistent and biased estimates if individual-specific effects are correlated with the independent variables (violation of strict exogeneity).

Therefore the pooled OLS method is chosen. However, a drawback of this approach is that it does not take into account the possible individual heterogeneity. To mitigate the risk of heterogeneity bias, several control variables reflecting company characteristics are included in the regression analysis. Additionally, year-fixed effects are captured by the year dummies.

First, the following estimation is used to examine the impact of sin firms and ESG on share price:

$$\begin{aligned} log(Share\_price_{it}) = \beta_0 + \beta_1 log(ESGC_{it-1}) + \beta_2 NIPS_{it-1} + \beta_3 BVPS_{it-1} \\ + \beta_4 LTDTA_{it-1} + \beta_5 log(Assets)_{it-1} + \beta_6 RDPS\_adjusted_{it-1} \\ + \beta_7 ROA_{it-1} + \beta_8 ROE_{it-1} + \beta_9 Sin_i + \beta_{10} Sin_i \times log(ESGC_{it-1}) \\ + \sum_{k=1}^{14} \beta_{10+k} Year\_effects + u_i + e_{it} \end{aligned} \quad (4.8)$$

with $i = 1, 2, ..., N$; $t = 1, 2, ..., T$.

The main variable of interest is the interaction term of the dummy variable *Sin* with the variable identifying the ESG performance *log(ESGC)*. This interaction term provides a valuable insight into how operating in the sin industry relative to other non-sin industries affects the ESG-CFP relationship. In case of no significant difference between sin and non-sin industries, the coefficient of interaction term would be insignificant. However, if the estimate is significant, the sign and magnitude would provide further details regarding the distinction between sin and non-sin industries. To control for the financial characteristics of companies, control variables for size, leverage, risk, investments in innovations, and financial profitability have been included in the regression. Following Havlinova and Kukacka (2023) the control variables and the variable identifying the ESG performance are lagged by quarter year against share price when examining the causal direction of ESG→CFP, allowing sufficient time for market assimilation of available information into the company's share price. Additionally, to account for general trends in the financial market, a series of year dummy has been included in the regression.

Secondly, to investigate the direction in which CFP is the driver of future

ESG performance, the following model is estimated:

$$\begin{aligned} log(ESGC_{it}) = \beta_0 + \beta_1 log(Share\_price_{it-1}) + \beta_2 NIPS_{it-1} + \beta_3 BVPS_{it-1} \\ + \beta_4 LTDTA_{it-1} + \beta_5 log(Assets)_{it-1} + \beta_6 RDPS\_adjusted_{it-1} \\ + \beta_7 ROA_{it-1} + \beta_8 ROE_{it-1} + \beta_9 Sin_i + \beta_{10} Sin_i \times log(Share\_price_{it-1}) \\ + \sum_{k=1}^{14} \beta_{10+k} Year\_effects + u_i + e_{it} \end{aligned} \quad (4.9)$$

with $i = 1, 2, ..., N$; $t = 1, 2, ..., T$.

Once again, the primary coefficient of interest is the interaction term, which provides insight into the impact of operating in the sin industry versus other non-sin industries on the relationship of CFP to ESG performance. In case of significance, it would suggest that there is a significant difference in the ESG-CFP relationship from the direction of CFP as a driver of ESG performance between the companies operating in sin and non-sin industries. Analogously to the previous model, control variables were included in the regression (year effects and financial variables). It is important to note that the lag of the control variables and the share price is set at one year, reflecting the longer time frame required for CFP to be reflected in ESG scores, given that ESG scores are only calculated on an annual basis.

These models were inspired by Havlinova and Kukacka (2023), who examined the relationship between stock prices and ESG after the financial crisis, and Novak and Bilinski (2018), who examined the social compensation of executives operating in sin industries.

4.4 Hypotheses

Based on the previous discussion, the following hypotheses are tested in the regressions.

Hypothesis 1 - ESG performance as the driver: ESG performance of period *t-1* Granger causes financial performance of period *t*.

Hypothesis 2 - CFP as the driver: Financial performance of period *t-1* Granger causes ESG performance of period *t*.

Hypothesis 3 - ESG performance as the driver in the sin industry : ESG per-

formance of companies in sin industries significantly influences their CFP compared to non-sin companies.

Hypothesis 4 - CFP as the driver in the sin industry: The CFP of companies in controversial industries significantly influences their ESG performance compared to non-sin companies.

Chapter 5

Empirical results

This chapter presents the empirical results of the regression models with possible interpretations. Additionally, the assumptions of the models are tested. Robustness test is conducted to examine the robustness of the results in different periods (before the financial crisis). Lastly, the limitations of the thesis are discussed.

5.1 Assumptions testing

5.1.1 Multicollinearity

Before proceeding with the estimations, it is essential to check for potential multicollinearity between the variables. Table 5.1 presents the correlation coefficient between two variables utilized in the PVAR model and the Granger causality test. The correlation coefficient between these two variables is notably low, suggesting that multicollinearity between the variables is unlikely to be a concern.

Table 5.2 summarises the correlation coefficients of the dataset used in comparative analysis in the Pesaran correlation matrix. The high correlation between the ESGC score and the environmental, social, and governance score is not surprising, given their inherent relationship. Also the high correlation between RDPS_zero and RDPS_adjusted is not surprising due to their nature. However, there might be a concern regarding the high correlation between ROA and NIPS. Therefore, the Variance inflation factor (VIF) coefficients were calculated for a detailed check of multicollinearity between the variables. As a general rule of thumb, a VIF above 5 indicates potential issues with correlation between the variables in the model. As the highest VIF value is for ROA

at 1.62, followed by NIPS at 1.51, there does not appear to be a significant multicollinearity problem among our variables.

Table 5.1: Correlation coefficient of variables used in the PVAR model and Granger causality test

	ESGC
Share price	0.06

Table 5.2: Correlation matrix of variables used in comparative analysis of ESG-CSR relationship

	NIPS	**BVPS**	**ROE**	**LTDTA**	**Assets**	**ROA**	**RDPS_zero**	**RDPS_adjusted**	**ESGC**	**E_score**	**S_score**	**G_score**
Share price	0.41	0.06	0.02	0.02	0.03	0.14	0.21	0.25	0.07	0.04	0.08	0.01
NIPS		-0.01	0.13	-0.03	0.11	0.56	0.07	0.10	0.06	0.06	0.07	0.04
BVPS			-0.03	-0.17	0.20	-0.01	0.02	0.01	0.03	0.09	0.02	0.08
ROE				0.02	-0.01	0.19	0.00	0.02	0.02	0.02	0.01	0.03
LTDTA					-0.03	-0.19	-0.09	-0.10	0.10	0.09	0.05	0.07
Assets						-0.06	-0.02	-0.00	-0.00	0.28	0.24	0.12
ROA							0.05	0.05	0.01	-0.02	0.02	-0.02
RDPS_zero								0.98	0.07	0.07	0.14	-0.02
RDPS_adjusted									0.08	0.09	0.15	-0.00
ESGC										0.72	0.73	0.62
E_score											0.73	0.43
S_score												0.38

5.1.2 Cross-sectional dependence

It is also advisable to check for cross-sectional dependence in the panel dataset utilizing Pesaran's CD test (Pesaran 2004). The influence of cross-sectional dependence varies, depending on the nature and magnitude (De Hoyos and Sarafidis 2006). The results suggest a presence of cross-sectional dependence in the dataset.

5.1.3 Panel unit root test

To apply the Granger causality test and examine the causality of the relationship of ESG-CFP, it is necessary to assess the stationarity of the panel data. In the context of panel data, stationarity tests can be divided into two generations (Hurlin and Mignon 2007).

The first-generation panel unit root tests assume cross-sectional independence. However, as the results in Subsection 5.1.2 show, there is evidence of cross-sectional dependence in our data. Therefore, these tests cannot be applied. The second-generation panel unit root tests, such as the panel covariate augmented Dickey-Fuller test introduced by Costantini and Lupi (2013), allow for cross-sectional dependence. This test builds on the work of Choi (2001); Demetrescu et al. (2006); Hansen (1995); Pesaran (2004). The test is based on the idea of combining the p-values of covariate augmented Dickey-Fuller test (an extended version of the standard Dickey-Fuller test) for individual panels.

The results presented in Table 5.3 indicate evidence to reject the null hypothesis of non-stationarity, suggesting that the assumption of stationarity is fulfilled for conducting the Granger causality test.

Table 5.3: Panel covariate Augmented Dickey-Fuller test

Individual-ADF test	p-value
log(Share_price)	1e-16
log(ESGC)	1e-16
Panel-ADF test	
test statistics	-8.22
p-value	1e-16

Note: Table presents the results of the panel covariate augmented Dickey-Fuller test in the unbalanced panel with cross-sectional dependence.

5.1.4 Heteroskedasticity

Given the diversity of the companies in the sample, it is reasonable to expect heterogeneity among them. To test this hypothesis, the Breush-Pagan test for the presence of heteroskedasticity was performed. The results of the test indeed indicate the presence of heteroskedasticity in all examined models.

5.1.5 Serial correlation in error

Furthermore, serial correlation in the errors was examined using Wooldridge's test for serial correlation in panel data. The null hypothesis of no autocorrelation was rejected in all models, suggesting the presence of serial correlation in disturbances.

To address both serial correlation in errors and heteroskedasticity, standard errors adjusted for heteroskedasticity and serial correlation were used in the analysis and reported in the summary tables.

5.2 PVAR

Following the model described in the previous chapter, two PVAR models were estimated according to Equation 4.2 and Equation 4.3. Before estimating the model, it is necessary to determine the correct lag length. Abrigo and Love (2016) and Andrews and Lu (2001) both suggest using MMSC. To compare different lag lengths of models, selection measures were calculated from PVAR models (first to third order), initially using up to three lags of CSR and CFP measure as instruments, similarly to Lin et al. (2019). Table 5.4 presents the criteria. Since the minimal values of MMSC:BIC, MMSC:AIC, and MMSC:HQIC are found for the first-order model, this model is used for estimation.

Table 5.4: Optimal moment and model selection criteria for panel VAR estimation.

Model	Lag	MMSC:BIC	MMSC:AIC	MMSC:HQIC
log(Share_price)	1	-1658.08	-115.75	-700.03
	2	-1504.54	-10.51	-589.39
	3	-1504.70	-5.042	-573.43

Note: The values of the moment and model selection criteria are depicted in the table. The first-order PVAR model has the minimized value of BIC, AIC, and HQIC. Therefore, the first-order model was selected for further estimation.

To ensure the stability of the PVAR model, the eigenvalues and their respective moduli must be strictly less than one to satisfy the condition of stability. The eigenvalues are complex numbers, consisting of both real and imaginary parts. The modulus is simply the absolute value of the eigenvalues. Table 5.5 shows the eigenvalues and moduli of each estimated model. Since the imaginary part of both eigenvalues is zero, the eigenvalues are equal to their absolute values, which are the moduli. Figure A.2 and Figure A.3 show the companion matrices, illustrating that the eigenvalue lies within the unit circle. From the values and corresponding figures, it is clear that the stability condition for PVAR models is satisfied.

Table 5.6 presents the coefficients from the panel VAR estimation. Due to

Table 5.5: Stability condition using eigenvalues.

Model	Eigenvalue		Modulus
	Real	Imaginary	
log(Share_price)	0.91	0	0.91
log(ESGC)	0.73	0	0.73

Note: Table presents the eigenvalues and the modulus of each estimated PVAR model. The stability condition is satisfied as each modulus is strictly less than 1.

the unavailability of annual ESGC scores for some companies, the number of panels covers 496 companies from S&P 500 index. Interestingly, the coefficients in both models are all significant at 1%, indicating a strong relationship between the variables.

Table 5.6: Panel VAR estimation results

	Dependent variable:	
	log(Share_price)	log(ESGC)
	(1)	(2)
$log(Share\_price)_{t-1}$	0.9097***	0.0644***
	(0.0093)	(0.0073)
$log(ESGC)_{t-1}$	0.0657***	0.7281***
	(0.0158)	(0.0185)
Constant	0.1990***	0.8156***
	(0.0425)	(0.0552)
Observations	7,190	7,190
Number of panels	496	496

Note: Table summarises the results from the panel VAR model examining the direction and sign of the ESG-CSR relationship. *Model 1* examines the direction in which ESG performance serves as the driver of CFP, while *model 2* studies the direction in which the CFP serves as the driver of ESG performance. The section of the lag length was determined using MMSC. The standard errors are reported in the parentheses, and p-values are identified as *p<0.1; **p<0.05; ***p<0.01.

The positive sign of the $log(ESGC)_{t-1}$ coefficient in *model 1* is significant at 1% significance level, which aligns with the social impact hypothesis, indicating that past ESG performance positively influences current CFP.

Similarly, the positive coefficient of the lagged variable $log(Share\_price)_{t-1}$ in the *model 2* is significant at the 1% significance level. This suggests that the CFP of the previous period is positively associated with the ESG performance of the current period, confirming the slack-resources hypothesis. This hypothesis suggests that as CFP improves, additional resources are available for ESG engagement, leading to an improvement in ESG performance. Both models suggest a significant positive relationship between ESG performance and CFP, supporting the positive synergy hypothesis. This finding implies the potential formation of a virtuous circle, where improved ESG performance leads to better CFP, which in turn leads to further improvements in ESG performance, and so on (Lin et al. 2019). These findings are consistent with the results of several meta-analyses (Orlitzky et al. 2003; Margolis and Walsh 2003; Margolis et al. 2009).

5.3 Granger causality

Following the results from the previous section, the Granger causality test from Dumitrescu and Hurlin (2012) was conducted. The results are concluded in the Table 5.7.

Table 5.7: Granger causality test

Null hypothesis	$\tilde{Z}$	p-value
Share price does not granger cause *ESGC score*	15.26	0.00
ESGC score does not granger cause *Share price*	11.58	0.00

Note: Table presents the results of the Granger causality test based on the Dumitrescu and Hurlin (2012).

The results suggest that both tested null hypotheses are rejected at the 1% significance level, implying the existence of bi-directional Granger causality between ESG performance and CFP. However, one should be cautious when interpreting the Granger causality results, as it does not imply a strict causality from one variable to another. Instead, it indicates the presence of predictive causality, meaning that past values of variables are useful in predicting others. According to the definition of Granger causality, a variable x is said not to Granger cause y, if the past values of x do not improve the prediction of y beyond the information already contained in the past values of y (Granger 1969).

In our context, the results suggest that the share price of the previous period is useful for predicting the current period's ESGC score. However, it does not imply that the historical share price is the only element driving the current period's ESGC score. Similarly, the ESGC score has some predictive power for forecasting share prices, but this does not mean that ESG performance is the sole driver of share prices.

5.4 Controversial industry

Building on the results of previous sections, both directions (CFP as a driver of ESG and vice versa) are further explored in the context of controversial industries, specifically the sin industries (alcohol, tobacco, and gambling). Furthermore, the impact of three individual pillars of ESG is examined in detail. Table 5.12 summarises results from this whole section into a comprehensive table.

Regarding the control variables, the estimates are not discussed in detail as they are not the primary focus of the thesis. The models include RDPS_adjusted, with unreported values replaced by 0,05% of revenues. Table A.1 in the appendix presents the estimates when using RDPS_zero, where missing values are replaced trivially by zero. The estimates show only minimal differences between the two methods, which holds for other models as well.

5.4.1 ESG→CFP

Table 5.8 and Table 5.9 present coefficients from regressions examining the effect of ESG performance on CFP.

Sin industry:

In *model 1*, the main indicator of the influence for the sin industry is the interaction term $log(ESGC)_{t-1} \times SIN$, which indicates the effect of past ESG performance on current CFP within the sin industry relative to other industries. However, in the *model 1*, the interaction term $log(ESGC)_{t-1} \times SIN$ is insignificant, thus there is no evidence that the ESG performance of companies in the sin industry has a different impact compared to companies in other industries.

Further examination was conducted on the pillar level of ESG, the environmental, social, and governance pillars. The analysis revealed that the environmental, social, and governance scores of sin companies do not have a signifi-

cantly different impact on CFP compared to non-sin companies, as displayed in Table 5.8 for the environmental pillar (E-pillar) and Table 5.9 for social and governance pillar (S-pillar and G-pillar). These results suggest that there is no overall effect of being a company operating in the sin industry compared to non-sin industries in the ESG-CSR relationship.

Tobacco industry:

When examining the three industries of the sin triumvirate separately, there is evidence of a negative effect of ESG performance on CFP within the tobacco industry compared to non-tobacco industries. The magnitude of the coefficient suggests that a one percentage point increase in the ESGC score of companies in the tobacco industry is associated with a 1,602% decrease in share price one-quarter year later relative to non-sin industries, all else being equal. This suggests that the impact of ESGC scores on CFP is smaller in the tobacco industry than in non-tobacco industries, suggesting that tobacco companies need to invest more to achieve the same positive impact on the CFP as companies in other industries.

Analogous to the influence of the overall ESGC score, the environmental score of a company operating in the tobacco industry has a negative and significant effect on its CFP compared to companies operating in other industries. Specifically, a one percentage point increase in environmental score leads to a decrease of 1,772% in share price compared to other industries, ceteris paribus (*model 4*). Additionally, a one percentage point increase in the social and governance score of companies operating in the tobacco industry is associated with decreases of 1,776% and 0,764% in share price compared to non-tobacco industries, respectively, holding all else constant (*models 6, 8*). These results suggest that companies operating in the tobacco industry face additional barriers to investing in ESG performance to drive the CFP, as they need to invest more to achieve the same positive influence on the CFP as the other companies.

Alcoholic industry:

The effect of ESG performance is significant for companies in the alcoholic beverage industry. On average, a one percentage point increase in the ESGC score leads to a 0,367% decrease in share price one-quarter year later compared to other industries. This result suggests that these companies need to invest

more in ESG engagement to achieve a similar positive effect on CFP as the other industries.

Interestingly, the environmental score of producers of alcoholic beverages is positive and significant at 1%. A one percentage point increase in environmental score is associated with a 2,808% increase in the company's share price, holding everything else constant (*model 4*). The social score of these companies is also positively associated with the share price, as a one percentage point increase in social score leads to a 0,515% increase in share price relative to other companies, all else being equal (*model 6*). These results suggest that the producers of alcoholic beverages have a better starting position, especially when investing in the environmental or social pillars, as the investments in these pillars have a greater impact on the CFP compared to other industries. However, a one percentage point increase in the governance score of companies producing alcoholic beverages is associated with a 0,704% decrease in share price compared to other industries, ceteris paribus (*model 8*). This suggests that investing in the governance pillar may not be as beneficial compared to non-sin companies.

Gambling industry:

It is worth highlighting that all coefficients related to the gambling industry are statistically insignificant. this implies a lack of evidence supporting a difference in the ESG-CSR relationship compared to non-gambling industries.

Short summary

To summarise the results of the regressions examining the causal direction ESG→CFP: Overall, there is no significant difference between the sin and non-sin industries in this causal direction of the ESG-CSR relationship. However, when examining each industry separately, notable differences occur. The ESG performance (measured by the ESGC score and also by each pillar) of companies operating in the tobacco industry has a significant negative effect on CFP compared to other industries. The causal direction ESG→CFP in companies operating in the alcohol industry is not straightforward. The overall ESGC score and the G-pillar suggest a negative association within the alcoholic industry compared to other industries. However, the E-pillar and the S-pillar suggest a positive relationship. Lastly, no significant difference in the causal direction ESG→CFP was found for companies operating in the gambling industry.

5.4.2 CFP→ESG

Table 5.10 and Table 5.11 present the results of models investigating the impact of CFP on the ESG performance.

Sin industry:

Across all models, the estimates of the interaction term between CFP and the dummy variable *Sin* are insignificant. This indicates a lack of evidence supporting a significant difference in the influence of CFP on ESG performance between companies operating in the sin industries and other industries.

However, upon closer examination of each of the sin industries individually, a significant relationship was found.

Alcoholic industry

Specifically, the CFP of companies producing alcoholic beverages shows a significant negative impact on the firm's ESG performance. A one percentage point increase in the share price corresponds to a decrease of 0,224% in the ESGC score, which is significant at 1%, everything else being equal.

It is important to note that a detailed analysis of the pillar scores suggests a negative association for each individual pillar. For a one percentage increase in share price, the E-pillar score, S-pillar, and G-pillar scores decrease by 0,345%, 0,241%, and 0,172%, respectively, compared to other industries, while keeping all other variables fixed. These results strongly suggest that the positive impact of share price growth on ESG performance is not observed to the same extent in the alcoholic beverages industry as in other sectors. One possible interpretation of these results could be the presence of additional barriers, such as social stigmatization within the alcoholic beverages industry. Alternatively, it may indicate support for the managerial opportunism hypothesis, suggesting that managers seek to prioritize other investments or self-reward rather than improving ESG performance.

Tobacco industry

The CFP of companies producing tobacco products also exhibits a negative association with their ESG performance. Specifically, a one percentage point increase in the share price of these companies leads to a decrease of 0,143% in the ESGC score, 0,642% decrease in the E-pillar score, and 0,156% decrease

in the S-score compared to companies operating in other industries, ceteris paribus. These effects are significant at the 1% level. Similar to the findings for alcoholic beverages, this negative relationship may suggest evidence of either managerial opportunism or the presence of social stigmatization barriers within the tobacco industry. However, the coefficient of the G-pillar is insignificant, suggesting that there is no significant difference between the producers of tobacco products and the other industries in this aspect.

Gambling industry

The coefficients for companies operating in the gambling industry are again insignificant, suggesting that there is no evidence of a distinct relationship between gambling and other industries in terms of the ESG-CSR relationship.

Short summary

To summarise the results from regressions examining the causal direction CFP→ ESG: Overall, there is no evidence of a difference between the companies operating in the sin and non-sin industries in this causal direction. The CFP of companies operating in the alcoholic industry has a negative effect on ESG performance (measured by the ESGC score and also by each pillar) compared to other industries. Similarly, the CFP of companies in the tobacco industry has a negative effect on ESG performance compared to other industries (measured by ESGC score, E-pillar, and S-pillar). The G-pillar effect is insignificant. Finally, there is a lack of evidence supporting a difference in the causal direction CFP→ESG within companies operating in the gambling industry.

5.5 Robustness test

5.5.1 Chow test

To assess the robustness of the findings, we further examine the effect of the chosen time period on the results. Scholars argue that the financial crisis significantly changed the financial management strategies (Giannarakis and Theotokas 2011; Karaibrahimoglu 2010; Chintrakarn et al. 2021). The global financial crisis, preceded by the U.S. subprime mortgage crisis in 2007, may have forced companies to minimize their ESG investments as financial stability took precedence at that time. However, some argue that engaging in ESG

initiatives could serve as an opportunity to rebuild customer trust and enhance branding, rather than being perceived as a threat (Giannarakis and Theotokas 2011).

Given these arguments, the analysis focuses on the period following the global financial crisis (2009-2023). To investigate whether estimates significantly differ before the financial crisis, the Chow test is used as it allows us to compare distinct regressions (Chow 1960; Toyoda 1974). It assesses whether there are significant differences in the ESG-CSR relationship before and after the financial crisis. Equation 5.1 is the general formula for Chow statistic, which may be sometimes too strict as it does not allow for any parameter to differ across subpopulations (Kukačka 2024). Alternatively, the less strict Chow test in Equation 5.2 allows intercept to change.

$$F = \frac{SSR_p - (SSR_{before} + SSR_{after})}{k+1} \times \frac{n - 2(k+1)}{SSR_{before} + SSR_{after}} \tag{5.1}$$

$$F = \frac{SSR'_p - (SSR_{before} + SSR_{after})}{k} \times \frac{n - 2(k+1)}{SSR_{before} + SSR_{after}} \tag{5.2}$$

where:

- SSR_p is the sum of squares of residuals for the pooled regression model with data from the period 2002 till 2023.
- SSR'_p is the sum of squares of residuals for the pooled regression model including a dummy for the intercept shift with data from the period 2002 till 2023.
- SSR_{before} and SSR_{after} are the sum of squares of residuals for the model utilizing the data before the financial crisis (2002-2008) and the model after the financial crisis (2009-2023).
- k is the number of independent variables in each model.
- n is the total number of observations in both datasets.

The Chow statistics for the models used to examine the ESG-CSR relationship in controversial industries are presented in Table 5.13. The results of both versions of the Chow test strongly support the rejection of the null hypothesis of

no significant difference in the coefficients between the models. This indicates that the assumption of a significant impact of the financial crisis was correct, and the choice of covered time period aligns with existing scholarly findings.

5.6 Limitations

It is important to acknowledge certain limitations of the thesis.

The availability of ESG performance data, specifically the ESGC score and the separate scores of the three pillars (E, S, G), is limited to an annual basis from the London Stock Exchange Group (LSEG) database. This constraint limited the construction of the model, particularly when focusing on the direction from CFP to ESG. The proposed quarter lag used in the model to examine the direction from ESG to CFP was not feasible in the direction from CFP to ESG due to the annual nature of the ESG data. Consequently, the interpretation and comparison of the models should be done with caution.

Another limitation relates to the inconsistency in the calculation of ESG scores, which varies across different data providers as discussed in Section 3.2. The thesis is restricted to ESG data from a single source due to access limitations, making it impossible to perform a robustness test utilizing other data sources.

Furthermore, the subset of observations from sin industries represents a relatively small proportion of the overall dataset. This imbalance may introduce bias by limiting variation within the data from sin industries and could impact the generalisability of the findings.

Finally, the panel dataset covers companies listed in the S&P 500 index as of December 2023. Therefore, it does not capture changes in the index constitutes that occurred before the snapshot and during the writing of the thesis. This may introduce survivorship bias into the findings.

Table 5.8: ESG→CFP in sin industries & E-pillar estimation

	Dependent variable: log(Share price)			
	(1)	(2)	(3)	(4)
$log(ESGC)$	−0.080	−0.081		
	(0.090)	(0.090)		
$log(E\_score)$			−0.018	−0.018
			(0.017)	(0.017)
Sin	−0.106		−0.474	
	(1.561)		(0.319)	
Gambling		0.236		−0.535
		(1.594)		(0.371)
Alcohol		1.691*		−11.550***
		(0.890)		(1.162)
Tobacco		6.709***		7.506***
		(1.092)		(2.030)
$log(ESGC) \times Sin$	−0.042			
	(0.369)			
$log(ESGC) \times Gambling$		−0.174		
		(0.391)		
$log(ESGC) \times Alcohol$		−0.376*		
		(0.216)		
$log(ESGC) \times Tobacco$		−1.602***		
		(0.237)		
$log(E\_score) \times Sin$			0.061	
			(0.058)	
$log(E\_score) \times Gambling$				0.050
				(0.060)
$log(E\_score) \times Alcohol$				2.808***
				(0.281)
$log(E\_score) \times Tobacco$				−1.772***
				(0.449)
Constant	2.563***	2.562***	2.290***	2.282***
	(0.643)	(0.643)	(0.650)	(0.651)
Year FE	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Number of observations	5401	5401	5401	5401

Note: Table presents the results of regressions examining the effect of ESG performance on CFP of companies operating in sin industries (*models 1; 2*). The influence of environmental pillar was examined, too (*models 3; 4*). The control variables and ESG performance variables are lagged by one-quarter year relative to the share price (subscripts have been omitted to save space). Statistical significance at 1%, 5%, and 10% is identified by *, **, ***, respectively.

Table 5.9: ESG→CFP, S-pillar & G-pillar estimation

	Dependent variable: log(Share price)			
	(5)	(6)	(7)	(8)
$log(S\_score)$	−0.018	−0.019		
	(0.090)	(0.090)		
$log(G\_score)$			−0.062	−0.063
			(0.058)	(0.058)
Sin	0.026		−0.264	
	(1.647)		(1.346)	
Gambling		1.129		−0.238
		(1.313)		(1.414)
Alcohol		−2.047**		2.965***
		(0.940)		(0.299)
Tobacco		7.522***		2.954***
		(1.881)		(0.262)
$log(S\_score) \times Sin$	−0.076			
	(0.383)			
$log(S\_score) \times Gambling$		−0.416		
		(0.315)		
$log(S\_score) \times Alcohol$		0.515**		
		(0.226)		
$log(S\_score) \times Tobacco$		−1.776***		
		(0.415)		
$log(G\_score) \times Sin$			−0.004	
			(0.320)	
$log(G\_score) \times Gambling$				−0.047
				(0.342)
$log(G\_score) \times Alcohol$				−0.704***
				(0.073)
$log(G\_score) \times Tobacco$				−0.764***
				(0.061)
Constant	2.542***	2.542***	2.637***	2.638***
	(0.647)	(0.648)	(0.642)	(0.643)
Year FE	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Number of observations	5401	5401	5401	5401

Note: Table presents the regression coefficients examining the effect of ESG performance on the CFP of companies operating in sin industries compared to those in other industries. Specifically, it examines the influence of the social pillar (*models 5; 6*) and the governance pillar (*models 7; 8*). The control variables and ESG performance variables are lagged by one-quarter year relative to the share price (subscripts have been omitted to save space). Statistical significance at 1%, 5%, and 10% is identified by *, **, ***, respectively.

Table 5.10: CFP→ESG in sin industries & E-pillar estimation

	Dependent variable:			
	log(ESGC)		log(E_score)	
	(9)	(10)	(11)	(12)
$log(Share\_price)$	−0.069	−0.016	−0.069	−0.071
	(0.114)	(0.020)	(0.114)	(0.114)
Sin	−2.803		−2.803	
	(3.196)		(3.196)	
Gambling		−0.489		−3.456
		(0.668)		(3.970)
Alcohol		1.129***		2.494***
		(0.155)		(0.734)
Tobacco		0.799***		3.008***
		(0.097)		(0.603)
$log(Share\_price) \times Sin$	0.773		0.773	
	(0.765)		(0.765)	
$log(Share\_price) \times Gambling$		0.063		0.833
		(0.171)		(0.921)
$log(Share\_price) \times Alcohol$		−0.224***		−0.345*
		(0.040)		(0.186)
$log(Share\_price) \times Tobacco$		−0.143***		−0.642***
		(0.035)		(0.183)
Constant	−14.487***	0.423*	−14.487***	−14.457***
	(1.535)	(0.222)	(1.535)	(1.534)
Year FE	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Number of observations	5359	5359	5359	5359

Note: Table presents the results of regression examining the impact of CFP on subsequent ESG performance of companies operating in sin industries (*models 9; 10*). The influence of environmental pillar is examined separately (*models 11; 12*). The control variables and the share price are lagged by one year relative to the dependent variables (subscripts have been omitted to save space). Statistical significance at 1%, 5%, and 10% is identified by *, **, ***, respectively.

Table 5.11: CFP→ESG, S-pillar & G-pillar estimation

	Dependent variable:			
	log(S_score)		log(G_score)	
	(13)	(14)	(15)	(16)
$log(Share\_price)$	−0.0005	−0.001	−0.023	−0.023
	(0.021)	(0.021)	(0.023)	(0.023)
Sin	−0.411		−0.567	
	(0.363)		(0.790)	
Gambling		−0.568**		−0.684
		(0.235)		(0.912)
Alcohol		1.205***		0.795***
		(0.147)		(0.191)
Tobacco		0.863***		0.338***
		(0.127)		(0.098)
$log(Share\_price) \times Sin$	0.086		0.108	
	(0.093)		(0.205)	
$log(Share\_price) \times Gambling$		0.067		0.090
		(0.061)		(0.232)
$log(Share\_price) \times Alcohol$		−0.241***		−0.172***
		(0.038)		(0.049)
$log(Share\_price) \times Tobacco$		−0.156***		−0.054
		(0.043)		(0.042)
Constant	0.626***	0.649***	1.716***	1.735***
	(0.242)	(0.242)	(0.273)	(0.273)
Year FE	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Number of observations	5359	5359	5359	5359

Note: Table presents the regression coefficients analyzing the impact of CFP on ESG performance of companies operating in sin industries, focusing on the influence of social pillar (*models 13; 14*) and governance pillars (*models 15; 16*). The control variables and the share price are lagged by one year relative to the dependent variables (subscripts have been omitted to save space). Statistical significance at 1%, 5%, and 10% is identified by *, **, ***, respectively.

Table 5.12: ESG-CSR relationship in sin and non-sin industry comparative analysis

Indicator	ESG→CFP	CFP→ESG
	Sin	
ESGC	insignificant	insignificant
E-pillar	insignificant	insignificant
S-pillar	insignificant	insignificant
G-pillar	insignificant	insignificant
	Tobacco	
ESGC	negative***	negative***
E-pillar	negative***	negative***
S-pillar	negative***	negative***
G-pillar	negative***	insignificant
	Alcohol	
ESGC	negative*	negative***
E-pillar	positive***	negative*
S-pillar	positive**	negative***
G-pillar	negative***	negative***
	Gambling	
ESGC	insignificant	insignificant
E-pillar	insignificant	insignificant
S-pillar	insignificant	insignificant
G-pillar	insignificant	insignificant

Note: Table presents a summary of results from regressions utilized in the comparative analysis of the ESG-CSR relationship between sin and non-sin industries. The first column presents the ESG performance indicator. The following columns present the examined causal direction. The negative and positive influence of operating in certain sin industries on the ESG-CSR relationship compared to non-sin industries are indicated in the table. In case of no evidence of difference, 'insignificant' was used. Statistical significance of corresponding coefficients at 1%, 5%, and 10% is identified by *, **, ***, respectively.

Table 5.13: Chow test Results

Model#	Dep.variable	Chow (1)	p-value (1)	Chow (2)	p-value (2)
(1)	log(Share price)	17.61	3.65×10^{-94}	18.13	1.56×10^{-94}
(2)	log(Share price)	18.33	1.60×10^{-98}	18.87	6.77×10^{-99}
(3)	log(Share price)	18.15	1.86×10^{-97}	18.70	7.18×10^{-98}
(4)	log(Share price)	18.68	1.08×10^{-100}	19.15	4.15×10^{-101}
(5)	log(Share price)	17.97	2.29×10^{-96}	18.52	8.88×10^{-97}
(6)	log(Share price)	18.49	1.71×10^{-99}	19.05	6.61×10^{-100}
(7)	log(Share price)	18.16	1.58×10^{-97}	18.71	6.26×10^{-98}
(8)	log(Share price)	18.41	4.99×10^{-99}	18.96	1.98×10^{-99}
(9)	log(ESGC)	3.57	8.49×10^{-11}	3.63	9.19×10^{-11}
(10)	log(ESGC)	3.54	1.19×10^{-10}	3.59	1.31×10^{-10}
(11)	log(E_score)	10.11	3.31×10^{-47}	10.45	3.26×10^{-49}
(12)	log(E_score)	10.37	1.05×10^{-48}	10.71	3.26×10^{-49}
(13)	log(S_score)	2.20	1.37×10^{-4}	2.19	1.78×10^{-4}
(14)	log(S_score)	2.56	4.33×10^{-6}	2.57	5.68×10^{-6}
(15)	log(G_score)	2.72	8.74×10^{-7}	2.81	5.29×10^{-7}
(16)	log(G_score)	2.38	2.52×10^{-5}	2.46	1.63×10^{-5}

Note: Table presents the Chow statistics of models examining the relationship between ESG-CSR in controversial industries from Section 5.4. Column *Chow (1)* presents Chow statistics calculated based on Equation 5.1 with corresponding p-values in column *p-value(1)*. Additionally, column *Chow (2)* presents Chow statistics from the formula allowing for intercept shift (Equation 5.2) with corresponding p-values in column *p-value(2)*.

Chapter 6

Conclusion

ESG, an acronym that has become part of business vocabulary, refers to the environmental, social, and governance considerations that companies are increasingly expected to address. Researchers are examining whether these ESG engagements should be seen as opportunities to improve financial performance, or rather as unnecessary costs that should be minimized.

There is a lack of consensus among scholars regarding the causality and sign of the relationship between ESG performance and CFP. This topic has been a subject of academic debate since the article of Moskowitz (1972), but there is still no consensus on whether financial performance drives ESG performance or vice versa. The discussion about the sign of the relationship is also unclear. Nevertheless, the majority of meta-analyses including studies by (Orlitzky et al. 2003; Margolis and Walsh 2003; Margolis et al. 2009), suggest that most of the studies report non-negative relationships between ESG and CFP.

The thesis contributes to the ongoing discussion by providing a PVAR model followed by Granger causality testing. The results of the PVAR model suggest a positive relationship between both directions of causality, ceteris paribus. This provides evidence for the positive synergy hypothesis, suggesting the potential creation of a virtuous circle between ESG-CFP. In this scenario, for example, improved CFP would contribute to better ESG performance, which in turn would further improve CFP, creating a self-reinforcing cycle of improvement. Furthermore, the results of Granger causality suggest a bi-directional relationship between the ESG and the financial performance of the companies. This finding is consistent with the findings of meta-analysis Orlitzky et al. (2003).

The second part of the thesis examines the ESG-CFP relationship within so-called "sin industries". These industries include companies operating in gam-

bling, tobacco production, and alcoholic beverages. The products and services of these industries can be seen as controversial and potentially detrimental to health, and their engagement in ESG could be seen as a way of improving their image and consequently their financial performance.

Based on the results from the PVAR and Granger causality tests, both causal directions of the ESG-CFP relationship were examined in a comparative analysis of sin and non-sin industries. The results do not suggest that being a company operating in sin industries has a significantly different effect on its ESG-CFP relationship compared to companies operating in other industries. These findings contrast with the findings of Du and Sun (2023), who find that the ESG scores of sin companies are significantly higher compared to the benchmark.

However, when examining each industry and each pillar separately, further insights emerge. Specifically, producers of tobacco products show a significantly negative effect compared to other industries, with almost all interaction terms (except when the case of the dependent variable is the G-pillar score) being significant and negative. This suggests that these companies may face negative perceptions from the investors and the market relative to other companies. Another plausible interpretation could be evidence supporting the managerial opportunism hypothesis, which suggests that managers may prioritize personal rewards or other investments over enhancing ESG performance.

The CFP of producers of alcoholic beverages exhibits a negative effect on the ESG score and each pillar compared to other companies. However, the relationship between ESG performance and its impact on CFP is not straightforward. While the environmental and social pillars have positive estimates, indicating that higher scores in these pillars have a greater positive effect on CFP compared to other industries, the effect of the ESGC score and governance pillar remains negative. These mixed results warrant further discussion and analysis to understand the underlying dynamics.

Interestingly, in the case of companies operating in the gambling industry, none of the interaction terms were statistically significant. This suggests that the gambling industry does not have a significantly different impact on the ESG-CFP relationship compared to other industries. This lack of statistical significance implies that the ESG-CFP relationship within the gambling industry may be similar to that of other industries, without any notable differences.

In conclusion, it is understandable that there is no significant effect of being

a company operating in the sin industry compared to other industries, given the variations observed across the three industries of the sin triumvirate.

The main limitation of the thesis is its reliance on a single data source. Therefore, future research could utilize multiple data sources to assess the robustness of the results, as different ESG providers may produce different calculations. Furthermore, with the full development of sustainability reporting requirements, it is expected that ESG data will become more consistent, frequent, and therefore more suitable for further research.

Bibliography

Abbott, W. F. and R. J. Monsen (1979). On the measurement of corporate social responsibility: Self-reported disclosures as a method of measuring corporate social involvement. *Academy of Management Journal 22*(3), 501–515.

Abrigo, M. R. and I. Love (2016). Estimation of panel vector autoregression in stata. *The Stata Journal 16*(3), 778–804.

Akaike, H. (1969). *Fitting autoregreesive models for prediction*. Springer.

Alexander, G. J. and R. A. Buchholz (1978). Corporate social responsibility and stock market performance. *Academy of Management Journal 21*(3), 479–486.

Allouche, J. and P. Laroche (2005). A meta-analytical investigation of the relationship between corporate social and financial performance. *Revue De Gestion des Ressources Humaines* (57), 18.

Andrews, D. W. and B. Lu (2001). Consistent model and moment selection procedures for gmm estimation with application to dynamic panel data models. *Journal of Econometrics 101*(1), 123–164.

Aupperle, K. E., A. B. Carroll, and J. D. Hatfield (1985). An empirical examination of the relationship between corporate social responsibility and profitability. *Academy of Management Journal 28*(2), 446–463.

Barnes Jr, J. H. and M. J. Dotson (1990). An exploratory investigation into the nature of offensive television advertising. *Journal of Advertising 19*(3), 61–69.

Barnett, M. L. and R. M. Salomon (2006). Beyond dichotomy: The curvilinear relationship between social responsibility and financial performance. *Strategic Management Journal 27*(11), 1101–1122.

Benson, K. L., T. J. Brailsford, and J. E. Humphrey (2006). Do socially responsible fund managers really invest differently? *Journal of Business Ethics 65*, 337–357.

Berg, F., J. F. Koelbel, and R. Rigobon (2022). Aggregate confusion: The divergence of esg ratings. *Review of Finance 26*(6), 1315–1344.

Blitz, D. and F. J. Fabozzi (2017). Sin stocks revisited: Resolving the sin stock anomaly. *The Journal of Portfolio Management 44*(1), 105–111.

Bowen, H. R. (1953). Social responsibilities of the businessman. *New York : Harper& Row*.

Bowman, E. H. and M. Haire (1975). A strategic posture toward corporate social responsibility. *California Management Review 18*(2), 49–58.

Bowman, S. A., S. L. Gortmaker, C. B. Ebbeling, M. A. Pereira, and D. S. Ludwig (2004). Effects of fast-food consumption on energy intake and diet quality among children in a national household survey. *Pediatrics 113*(1), 112–118.

Busch, T. and G. Friede (2018). The robustness of the corporate social and financial performance relation: A second-order meta-analysis. *Corporate Social Responsibility and Environmental Management 25*(4), 583–608.

Byrne, E. F. (2010). The US military-industrial complex is circumstantially unethical. *Journal of Business Ethics 95*, 153–165.

Cai, Y., H. Jo, and C. Pan (2012). Doing well while doing bad? CSR in controversial industry sectors. *Journal of Business Ethics 108*, 467–480.

Campbell, J. L. (2007). Why would corporations behave in socially responsible ways? An institutional theory of corporate social responsibility. *Academy of Management Review 32*(3), 946–967.

Carroll, A. B. (1979). A three-dimensional conceptual model of corporate performance. *Academy of Management Review 4*(4), 497–505.

Carroll, A. B. (1991). The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders. *Business Horizons 34*(4), 39–48.

Carroll, A. B. (1999). Corporate social responsibility: Evolution of a definitional construct. *Business & society 38*(3), 268–295.

Cayón, E. and J. C. Gutierrez (2021). Sin stocks and ESG scores: Does the nature of your business really matter? *Journal of International Studies 14*(3).

Chatterji, A. K., D. I. Levine, and M. W. Toffel (2009). How well do social ratings actually measure corporate social responsibility? *Journal of Economics & Management Strategy 18*(1), 125–169.

Chintrakarn, P., P. Jiraporn, and S. Treepongkaruna (2021). How do independent directors view corporate social responsibility (CSR) during a stressful time? Evidence from the financial crisis. *International Review of Economics & Finance 71*, 143–160.

Choi, I. (2001). Unit root tests for panel data. *Journal of International Money and Finance 20*(2), 249–272.

Chollet, P. and B. W. Sandwidi (2018). CSR engagement and financial risk: A virtuous circle? International evidence. *Global Finance Journal 38*, 65–81.

Chong, J., M. Her, and G. M. Phillips (2006). To sin or not to sin? Now that's the question. *Journal of Asset Management 6*, 406–417.

Chow, G. C. (1960). Tests of equality between sets of coefficients in two linear regressions. *Econometrica: Journal of the Econometric Society*, 591–605.

Christensen, D. M., G. Serafeim, and A. Sikochi (2022). Why is corporate virtue in the eye of the beholder? The case of ESG ratings. *The Accounting Review 97*(1), 147–175.

Committee for Economic Development (1971). Social responsibilities of business corporations.

Corrao, G., V. Bagnardi, A. Zambon, and C. La Vecchia (2004). A meta-analysis of alcohol consumption and the risk of 15 diseases. *Preventive Medicine 38*(5), 613–619.

Costantini, M. and C. Lupi (2013). A simple panel-CADF test for unit roots. *Oxford Bulletin of Economics and Statistics 75*(2), 276–296.

Dahlsrud, A. (2008). How corporate social responsibility is defined: an analysis of 37 definitions. *Corporate Social Responsibility and Environmental Management 15*(1), 1–13.

Davis, K. (1960). Can business afford to ignore social responsibilities? *California Management Review 2*(3), 70–76.

Davis, K. (1973). The case for and against business assumption of social responsibilities. *Academy of Management Journal 16*(2), 312–322.

De Hoyos, R. E. and V. Sarafidis (2006). Testing for cross-sectional dependence in panel-data models. *The Stata Journal 6*(4), 482–496.

De Roeck, K. and N. Delobbe (2012). Do environmental CSR initiatives serve organizations' legitimacy in the oil industry? Exploring employees' reactions through organizational identification theory. *Journal of Business Ethics 110*, 397–412.

Demetrescu, M., U. Hassler, and A.-I. Tarcolea (2006). Combining significance of correlated statistics with application to panel data. *Oxford Bulletin of Economics and Statistics 68*(5), 647–663.

Derwall, J., K. Koedijk, and J. Ter Horst (2011). A tale of values-driven and profit-seeking social investors. *Journal of Banking & Finance 35*(8), 2137–2147.

Doll, R. and A. B. Hill (1950). Smoking and carcinoma of the lung. *British Medical Journal 2*(4682), 739.

Du, L. Y. and J. Sun (2023). Washing away their stigma? The ESG of "Sin" firms. *Finance Research Letters 55*, 103938.

Du, S. and E. T. Vieira (2012). Striving for legitimacy through corporate social responsibility insights from oil companies. *Journal of Business Ethics 110*, 413–427.

Dumitrescu, E.-I. and C. Hurlin (2012). Testing for granger non-causality in heterogeneous panels. *Economic Modelling 29*(4), 1450–1460.

Durand, R. B., S. Koh, and P. L. Tan (2013). The price of sin in the pacific-basin. *Pacific-Basin Finance Journal 21*(1), 899–913.

Eccles, R. G., I. Ioannou, and G. Serafeim (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science 60*(11), 2835–2857.

EU Commission (2023). Commission delegated regulation supplementing directive 2013/34/eu of the european parliament and of the council as regards sustainability reporting standards. `https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=PI_COM:C(2023)5303`. Accessed: March 4, 2024.

European Commission (2023). COMMISSION DELEGATED REGULATION (EU) /... supplementing Directive 2013/34/EU of the European Parliament and of the Council as regards sustainability reporting standards. `https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=PI_COM:C(2023)5303`. [C/2023/5303 final].

Fabozzi, F. J., A. S. Lamba, T. Nishikawa, R. P. Rao, and K. Ma (2019). Does the corporate bond market overvalue bonds of sin companies? *Finance Research Letters 28*, 165–170.

Fabozzi, F. J., K. Ma, and B. J. Oliphant (2008). Sin stock returns. *The Journal of Portfolio Management 35*(1), 82–94.

Fahy, J., D. Smart, W. Pride, and O. Ferrell (1995). Advertising sensitive products. *International Journal of Advertising 14*(3), 231–243.

Fam, K. S. and D. S. Waller (2003). Advertising controversial products in the Asia Pacific: What makes them offensive? *Journal of Business Ethics 48*, 237–250.

Fam, K. S., D. S. Waller, and B. Z. Erdogan (2004). The influence of religion on attitudes towards the advertising of controversial products. *European Journal of Marketing 38*(5/6), 537–555.

Fama, E. F. and K. R. French (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics 33*(1), 3–56.

Fama, E. F. and K. R. French (1997). Industry costs of equity. *Journal of Financial Economics 43*(2), 153–193.

Fama, E. F. and K. R. French (2015). A five-factor asset pricing model. *Journal of Financial Economics 116*(1), 1–22.

Fama, Eugene F French, K. R. (2007). Disagreement, tastes, and asset prices. *Journal of Financial Economics 83*(3), 667–689.

Farrelly, M. C., C. G. Healton, K. C. Davis, P. Messeri, J. C. Hersey, and M. L. Haviland (2002). Getting to the truth: evaluating national tobacco countermarketing campaigns. *American Journal of Public Health 92*(6), 901–907.

Fauver, L. and M. B. McDonald IV (2014). International variation in sin stocks and its effects on equity valuation. *Journal of Corporate Finance 25*, 173–187.

Fleischhacker, S. E., K. R. Evenson, D. A. Rodriguez, and A. S. Ammerman (2011). A systematic review of fast food access studies. *Obesity Reviews 12*(5), e460–e471.

Friede, G., T. Busch, and A. Bassen (2015). ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment 5*(4), 210–233.

Friedman, M. (1962). Capitalism and freedom. *University Press of Chicago*.

Friedman, M. (1970a). The social responsibility of business is to increase its profits. *The New York Times Magazine*.

Friedman, M. (1970b). A theoretical framework for monetary analysis. *Journal of Political Economy 78*(2), 193–238.

Galant, A. and S. Cadez (2017). Corporate social responsibility and financial performance relationship: A review of measurement approaches. *Economic Research-Ekonomska Istraživanja 30*(1), 676–693.

Giannarakis, G. and I. Theotokas (2011). The effect of financial crisis in corporate social responsibility performance. *International Journal of Marketing Studies 3*(1), 2.

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*, 424–438.

Griffin, J. M. and M. L. Lemmon (2002). Book-to-market equity, distress risk, and stock returns. *The Journal of Finance 57*(5), 2317–2336.

Grougiou, V., E. Dedoulis, and S. Leventis (2016). Corporate social responsibility reporting and organizational stigma: The case of "sin" industries. *Journal of Business Research 69*(2), 905–914.

Günther, E. and A.-K. Hüske (2015). How stakeholder shape innovation in controversial industries: the biotechnology industry in germany. *Umweltwirtschaftsforum 23*, 77–86.

Hannan, E. J. and B. G. Quinn (1979). The determination of the order of an autoregression. *Journal of the Royal Statistical Society: Series B (Methodological) 41*(2), 190–195.

Hansen, B. E. (1995). Rethinking the univariate approach to unit root testing: Using covariates to increase power. *Econometric Theory 11*(5), 1148–1171.

Havlinova, A. and J. Kukacka (2023). Corporate social responsibility and stock prices after the financial crisis: The role of strategic CSR activities. *Journal of Business Ethics 182*(1), 223–242.

Hillman, A. J. and G. D. Keim (2001). Shareholder value, stakeholder management, and social issues: What's the bottom line? *Strategic Management Journal 22*(2), 125–139.

Hodgins, D. C., J. N. Stea, and J. E. Grant (2011). Gambling disorders. *The Lancet 378*(9806), 1874–1884.

Holtz-Eakin, D., W. Newey, and H. S. Rosen (1988). Estimating vector autoregressions with panel data. *Econometrica: Journal of the Econometric Society*, 1371–1395.

Hong, H. and M. Kacperczyk (2009). The price of sin: The effects of social norms on markets. *Journal of Financial Economics 93*(1), 15–36.

Housman, M. G. (2001). Smoking and health: The 1964 Surgeon General's report as a turning point in the anti-smoking movement. *Harvard Health Policy Review 2*(1), 118–126.

Hsu, G., J. Y. Sun, S.-H. Zhu, et al. (2018). Evolution of electronic cigarette brands from 2013-2014 to 2016-2017: analysis of brand websites. *Journal of Medical Internet Research 20*(3), e8550.

Hurlin, C. and V. Mignon (2007). Second generation panel unit root tests.

Jan, C.-L. and J. A. Ou (2012). Negative-book-value firms and their valuation. *Accounting Horizons 26*(1), 91–110.

Jenkins, H. and N. Yakovleva (2006). Corporate social responsibility in the mining industry: Exploring trends in social and environmental disclosure. *Journal of Cleaner Production 14*(3-4), 271–284.

Jo, H. and H. Na (2012). Does CSR reduce firm risk? Evidence from controversial industry sectors. *Journal of Business Ethics 110*, 441–456.

Karaibrahimoglu, Y. Z. (2010). Corporate social responsibility in times of financial crisis. *African Journal of Business Management 4*(4), 382.

Kilian, T. and N. Hennigs (2014). Corporate social responsibility and environmental reporting in controversial industries. *European Business Review 26*(1), 79–101.

Kukačka, J. (2024, April). Lecture notes - Qualitative analysis & Linear probability model, Lecture 9, Econometrics I.

Landman, A., P. M. Ling, and S. A. Glantz (2002). Tobacco industry youth smoking prevention programs: protecting the industry and hurting tobacco control. *American Journal of Public Health 92*(6), 917–930.

Leventhal, A. M., D. R. Strong, M. G. Kirkpatrick, J. B. Unger, S. Sussman, N. R. Riggs, M. D. Stone, R. Khoddam, J. M. Samet, and J. Audrain-McGovern (2015). Association of electronic cigarette use with initiation of combustible tobacco product smoking in early adolescence. *Jama 314*(7), 700–707.

Levin, M. L., H. Goldstein, and P. R. Gerhardt (1950). Cancer and tobacco smoking: a preliminary report. *Journal of the American Medical Association 143*(4), 336–338.

Lin, W. L., S. H. Law, J. A. Ho, and M. Sambasivan (2019). The causality direction of the corporate social responsibility–corporate financial performance nexus: Application of panel vector autoregression approach. *The North American Journal of Economics and Finance 48*, 401–418.

Lindorff, M., E. Prior Jonson, and L. McGuire (2012). Strategic corporate social responsibility in controversial industry sectors: The social value of harm minimisation. *Journal of Business Ethics 110*, 457–467.

Liu, Y., H. Lu, and K. Veenstra (2014). Is sin always a sin? The interaction effect of social norms and financial incentives on market participants' behavior. *Accounting, Organizations, and Society 39*(4), 289–307.

Lobe, S. and C. Walkshäusl (2016). Vice versus virtue investing around the world. *Review of Managerial Science 10*, 303–344.

Lopez, L. and S. Weber (2017). Testing for granger causality in panel data. *The Stata Journal 17*(4), 972–984.

López, M. V., A. Garcia, and L. Rodriguez (2007). Sustainable development and corporate performance: A study based on the dow jones sustainability index. *Journal of Business Ethics 75*, 285–300.

Love, I. and L. Zicchino (2006). Financial development and dynamic investment behavior: Evidence from panel var. *The Quarterly Review of Economics and Finance 46*(2), 190–210.

LSEG Data & Analytics (2023). Environmental, social and governance scores from lseg. `https://www.lseg.com/en/data-analytics/sustainable-finance/esg-scores`. Accessed: March 10, 2024.

Luck, C. G. and K. Wood (1992). Wages of sin: Ethical investing and performance. *The Journal of Investing 1*(2), 15–21.

Luo, H., I. Liu, and N. Tripathy (2021). A study on firms with negative book value of equity. *International Review of Finance 21*(1), 145–182.

Makni, R., C. Francoeur, and F. Bellavance (2009). Causality between corporate social performance and financial performance: Evidence from canadian firms. *Journal of Business Ethics 89*, 409–422.

Margolis, J. D., H. A. Elfenbein, and J. P. Walsh (2009). Does it pay to be good... and does it matter? A meta-analysis of the relationship between corporate social and financial performance. *And does it matter*.

Margolis, J. D. and J. P. Walsh (2003). Misery loves companies: Rethinking social initiatives by business. *Administrative Science Quarterly 48*(2), 268–305.

McGuire, C. (1963). A process approach to the construction and analysis of medical examinations. *Academic Medicine 38*(7), 556–563.

McGuire, J. B., A. Sundgren, and T. Schneeweis (1988). Corporate social responsibility and firm financial performance. *Academy of Management Journal 31*(4), 854–872.

McWilliams, A. and D. Siegel (2000). Corporate social responsibility and financial performance: correlation or misspecification? *Strategic Management Journal 21*(5), 603–609.

Moore, G. (2001). Corporate social and financial performance: An investigation in the UK supermarket industry. *Journal of Business Ethics 34*, 299–315.

Moskowitz, M. (1972). Choosing socially responsible stocks. *Business and Society Review 1*(1), 71–75.

Musk, A. W. and N. H. De Klerk (2003). History of tobacco and health. *Respirology 8*(3), 286–290.

Niszczota, P. and M. Białek (2021). Women oppose sin stocks more than men do. *Finance Research Letters 41*, 101803.

Nobel Prize Outreach (2023). Christopher A. Sims – Facts. `https://www.nobelprize.org/prizes/economic-sciences/2011/sims/facts/`. Accessed on April 11, 2024.

Novak, J. and P. Bilinski (2018). Social stigma and executive compensation. *Journal of Banking & Finance 96*, 169–184.

Organization for Economic Co-operation and Development (2001). Corporate responsibility: Private initiatives and public goals.

Orlitzky, M., F. L. Schmidt, and S. L. Rynes (2003). Corporate social and financial performance: A meta-analysis. *Organization Studies 24*(3), 403–441.

Palazzo, G. and U. Richter (2005). CSR business as usual? The case of the tobacco industry. *Journal of Business Ethics 61*, 387–401.

Pesaran, M. H. (2004). General diagnostic tests for cross section dependence in panels. Cambridge Working Papers. *Economics 1240*(1), 1.

Phillips, P. J. (2011). Sin stocks in self managed superannuation funds. *Australasian Accounting Business and Finance Journal 5*(2), 39–51.

Preston, L. E. and D. P. O'bannon (1997). The corporate social-financial performance relationship: A typology and analysis. *Business & Society 36*(4), 419–429.

Raylu, N. and T. P. Oei (2002). Pathological gambling: A comprehensive review. *Clinical Psychology Review 22*(7), 1009–1061.

Rehman, S. N. and J. R. Brooks Jr (1987). Attitudes toward television advertisements for controversial products. *Marketing Health Services 7*(3), 78.

Roerecke, M. and J. Rehm (2013). Alcohol use disorders and mortality: a systematic review and meta-analysis. *Addiction 108*(9), 1562–1578.

Salaber, J. M. (2009). Sin stock returns over the business cycle. *Available at SSRN 1443188*.

Samuelson, P. (1971). Love that corporation. Mountain Bell Magazine. *Carroll, A.(1999) Corporate Social Responsibility-Evolution of a Definitional Construct. Business & Society, Sage Publications, Inc 38*(3), 268–295.

Scholtens, B. (2008). A note on the interaction between corporate social responsibility and financial performance. *Ecological Economics 68*(1-2), 46–55.

Schrek, R., L. A. Baker, G. P. Ballard, and S. Dolgoff (1950). Tobacco smoking as an etiologic factor in disease. I. Cancer. *Cancer Research 10*(1), 49–58.

Schwarz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics*, 461–464.

Sethi, S. P. (1975). Dimensions of corporate social performance: An analytical framework. *California Management review 17*(3), 58–64.

Shank, T. M., D. K. Manullang, and R. P. Hill (2005). Is it better to be naughty or nice? *The Journal of Investing 14*(3), 82–88.

Siegel, D. S. and D. F. Vitaliano (2007). An empirical analysis of the strategic use of corporate social responsibility. *Journal of Economics & Management Strategy 16*(3), 773–792.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica: Journal of the Econometric Society*, 1–48.

Soneji, S., J. L. Barrington-Trimis, T. A. Wills, A. M. Leventhal, J. B. Unger, L. A. Gibson, J. Yang, B. A. Primack, J. A. Andrews, R. A. Miech, et al. (2017). Association between initial use of e-cigarettes and subsequent cigarette smoking among adolescents and young adults: a systematic review and meta-analysis. *JAMA Pediatrics 171*(8), 788–797.

Toyoda, T. (1974). Use of the chow test under heteroscedasticity. *Econometrica: Journal of the Econometric Society*, 601–608.

United Nations Economic and Social Council Ad Hoc Inter-agency Task Force on Tobacco Control (2008). Report of the secretary-general, 2008. `http:https://digitallibrary.un.org/record/628255/usage`. Accessed: March 4, 2024.

United Nations Global Contact (2004). Who cares wins: Connecting financial markets to a changing world. `http://documents.worldbank.org/curated/en/280911488968799581/Who-cares-wins-connecting-financial-markets-to-a-changing-world`.

United States Surgeon General's Advisory Committee on Smoking and Health (1964). *Smoking and Health: Report of the Advisory Committee to the Surgeon General of the United States*. Number Public Health Service Publication No. 1103. Public Health Service.

Van der Laan, G., H. Van Ees, and A. Van Witteloostuijn (2008). Corporate social and financial performance: An extended stakeholder theory, and empirical test with accounting measures. *Journal of Business Ethics 79*, 299–310.

Vance, S. C. (1975). Are socially responsible corporations good investment risks. *Management Review 64*(8), 19–24.

Waddock, S. A. and S. B. Graves (1997). The corporate social performance–financial performance link. *Strategic Management Journal 18*(4), 303–319.

Waller, D. S., K.-S. Fam, and B. Zafer Erdogan (2005). Advertising of controversial products: a cross-cultural study. *Journal of Consumer Marketing 22*(1), 6–13.

Walton, C. C. (1967). *Corporate social responsibilities*.

Wang, H., W. Lu, M. Ye, K. Chau, and X. Zhang (2016). The curvilinear relationship between corporate social performance and corporate financial performance: Evidence from the international construction industry. *Journal of Cleaner Production 137*, 1313–1322.

Wartick, S. L. and P. L. Cochran (1985). The evolution of the corporate social performance model. *Academy of Management review 10*(4), 758–769.

Wilson, A. and C. West (1981). The marketing of unmentionables. *Harvard Business Review 59*(1), 91–102.

Wood, D. J. (1991). Corporate social performance revisited. *Academy of Management Review 16*(4), 691–718.

Wooldridge, J. M. (2012). *Introductory Econometrics: A Modern Approach*. Cengage Learning.

World Health Organization (2004). *Tobacco Industry and Corporate Social Responsibility ... an Inherent Contradiction*. UCSF: Center for Tobacco Control Research and Education. Retrieved: March 4, 2024.

World Health Organization (2023a). New WHO Campaign Highlights Tobacco Industry Tactics to Influence Public Health Policies. `https://www.who.int/news/item/16-11-2023-new-who-campaign-highlights-tobacco-industry-tactics-to-influence-public-health-policies`. Accessed: March 4, 2024.

World Health Organization (2023b). Tobacco exposed 2023. `https://www.who.int/news-room/spotlight/tobacco-exposed-2023`. Accessed: March 4, 2024.

Wynder, E. L. and E. A. Graham (1950). Tobacco smoking as a possible etiologic factor in bronchiogenic carcinoma: a study of six hundred and eighty-four proved cases. *Journal of the American Medical Association 143*(4), 329–336.

Yani-de Soriano, M., U. Javed, and S. Yousafzai (2012). Can an industry be socially responsible if its products harm consumers? The case of online gambling. *Journal of Business Ethics 110*, 481–497.

Yoon, Y., Z. Gürhan-Canli, and N. Schwarz (2006). The effect of corporate social responsibility (CSR) activities on companies with bad reputations. *Journal of Consumer Psychology 16*(4), 377–390.

Appendix A

Additional charts and tables

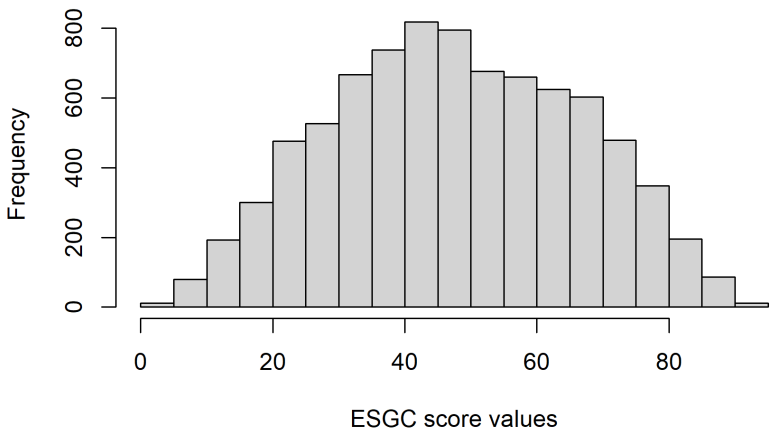


Figure A.1: Histogram of ESGC score variable in dataset examining the ESG-CFP relationship

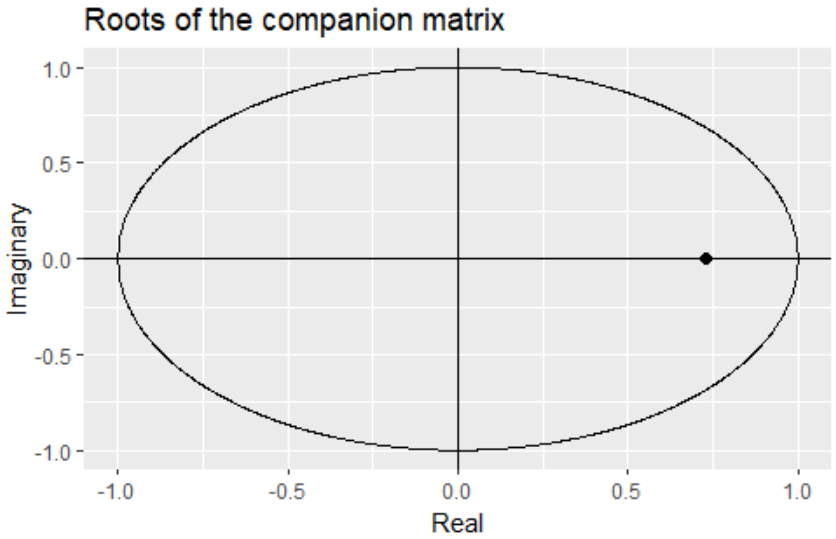


Figure A.2: Companion matrix with depicted eigenvalue of the model with dependent variable log(ESGC)

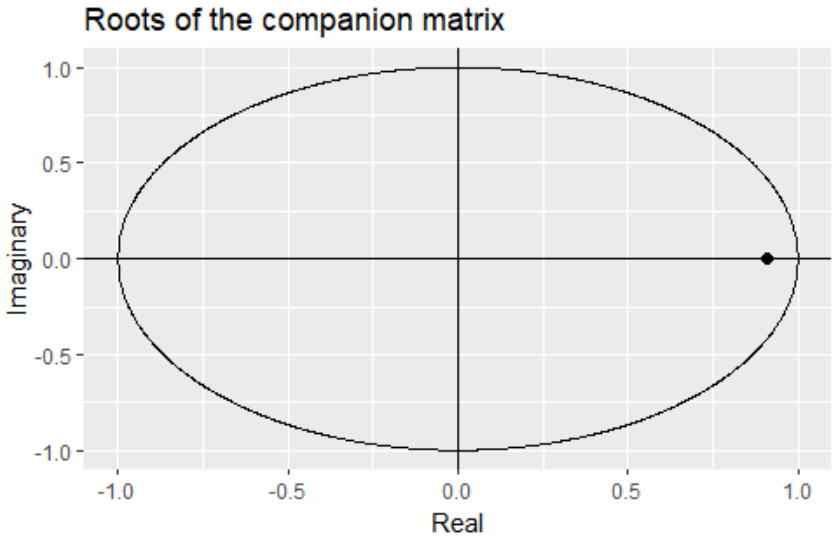


Figure A.3: Companion matrix with depicted eigenvalue of the model with dependent variable log(Share_price)

Table A.1: Controversial industries ESG -> CFP, comparison of RDPS variations

	Dependent variable: log(ESGC)			
	(1)	(2)	(3)	(4)
$log(Share\_price)$	−0.015	−0.015	−0.016	−0.016
	(0.020)	(0.020)	(0.020)	(0.020)
RDPS_zero	0.042	0.043		
	(0.027)	(0.027)		
RDPS_adjusted			0.043	0.044
			(0.028)	(0.028)
Sin	−0.345		−0.346	
	(0.587)		(0.588)	
Gambling		−0.488		−0.489
		(0.668)		(0.668)
Alcohol		1.131***		1.129***
		(0.154)		(0.155)
Tobacco		0.798***		0.799***
		(0.097)		(0.097)
$log(Share\_price) \times Sin$	0.078		0.078	
	(0.154)		(0.154)	
$log(Share\_price) \times Gambling$		0.063		0.063
		(0.171)		(0.171)
$log(Share\_price) \times Alcohol$		−0.225***		−0.224***
		(0.040)		(0.040)
$log(Share\_price) \times Tobacco$		−0.143***		−0.143***
		(0.035)		(0.035)
Constant	0.394*	0.414*	0.403*	0.423*
	(0.222)	(0.221)	(0.223)	(0.222)
Year FE	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes

Note: Table presents the regression coefficients for comparative analysis of the impact of ESG performance on CFP of companies operating in sin and non-sin industries. *Models 1, 2* presents coefficients when one of the control variables is RDPS_zero. *Models 3, 4* display coefficients when RDPS_adjusted is utilized as one of the control variables. Statistical significance at 1%, 5%, 10% is identified by *, **, ***, respectively.