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# **Herding Behavior and ESG Performance During a Crisis**

Evidence from the EURO STOXX 50 in the context of COVID-19

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**ABSTRACT:**

This thesis investigates herd behavior in Europe during the COVID-19 pandemic and whether ESG scores amplify this behavior. The analysis utilizes data from the EURO STOXX 50 companies for the period from 2020 to 2022.

This thesis employs the cross-sectional absolute deviation (CSAD) to measure the degree of herding based on Chang et al.'s (2000) model. The model further incorporates ESG scores and interaction terms capturing the effect of the COVID-19 pandemic, following the approach of Gavrilakis and Floros (2023).

The results suggest that a higher ESG score is not associated with stronger herding behavior. The results imply that ESG transparency may reduce informational asymmetry, encouraging more independent investor behavior. Similarly, the hypothesis of herding behavior intensifying during the COVID-19 outbreak is not supported. Extreme market conditions do not increase the dispersion of the returns in this dataset. This challenges previous literature that suggests stronger herding during a crisis.

Overall, the results of this thesis suggest that neither ESG performance or the COVID-19 pandemic significantly increased herding behavior in EURO STOXX 50 firms. It proposes that these large-cap and liquid companies may mitigate herd tendencies. The findings highlight the importance of context when analyzing herding and suggest that future research should explore the role of ESG in less transparent or smaller-cap markets.

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**KEYWORDS:** Herding, COVID-19, Cross-sectional absolute deviation, Market-wide herding, Developed markets, Behavioral Finance

## Contents

1	Introduction	6
1.1	Purpose of the Study	7
1.2	Research Hypotheses	7
1.3	Structure of the Study	10
2	Theoretical Background	11
2.1	Traditional Finance	11
2.1.1	Efficient market hypothesis	11
2.1.2	Capital Asset Pricing Model	13
2.1.3	Three-factor model	15
2.1.4	Behavioral Finance Opposing Efficient Markets	16
2.2	Behavioral Finance	17
2.2.1	Herding Behavior	17
2.2.2	Types of Herding	19
3	Literature Review	23
3.1	Foundations of Corporate Social Responsibility	23
3.1.1	Corporate Social Responsibility	23
3.1.2	Socially Responsible Investment	24
3.2	Environment, Social, Governance (ESG)	25
3.2.1	ESG Score	27
3.2.2	Relationship Between ESG and Financial Performance	28
3.3	ESG Herding	30
3.3.1	Drivers of ESG Herding	30
3.3.2	Empirical Evidence on ESG Herding	32
3.4	Herding During COVID-19	34
4	Data and Methodology	36
4.1	Data Description	36
4.2	Methodology	37
4.3	Descriptive Statistics	41

5	Empirical Results	44
5.1	The Impact of ESG Scores on Herding	44
5.2	Herding behavior during COVID-19	47
5.3	Limitations	50
6	Conclusion	52
	References	56

**Figures**

<b>Figure 1.</b> Divisions of herding (Bikhchandani & Sharma, 2000).	19
<b>Figure 2,</b> The daily returns of EURO STOXX 50	42
<b>Figure 3,</b> The relationship between CSAD and market returns	43

**Tables**

<b>Table 1,</b> Methodology used for the construction of variables.	38
<b>Table 2,</b> Descriptive Statistics.	41
<b>Table 3,</b> The regression results for herding analysis.	45
<b>Table 4,</b> The regression results for the COVID-19 interaction term.	48

# 1 Introduction

In the past decade, sustainable investing and environmental, social, and governance (ESG) factors have gained significant traction in the investment landscape. Climate-related risks, increased regulatory requirements, and stakeholder pressure drive investors to integrate ESG criteria into their portfolio decisions. Consequently, ESG ratings have become essential for evaluating a company's sustainability performance as investors increasingly consider non-financial factors in their decision-making processes.

The rapid growth of ESG investing and the sustainability trend may raise concerns regarding investor behavior and market dynamics. Herding behavior, where investors mimic the actions of others instead of making independent decisions, is a form of investor irrationality. Herd behavior in the financial markets has been extensively researched, but the implications in the context of ESG investing remain relatively unexplored. Due to the growing popularity of ESG investing, market participants may be encouraged to follow trends without sufficient due diligence. This could result in distorted asset prices, suboptimal capital allocation, or even ESG bubbles.

This thesis contributes to the literature by examining the relationship between ESG scores and herding behavior in the European stock market during 2020-2022. As the period was significantly affected by COVID-19, this thesis also contributes to the common assumption that herd behavior amplifies during crises and examines whether herd behavior intensified as a result of the pandemic's onset.

## **1.1 Purpose of the Study**

This thesis examines whether higher ESG scores acts as a driver of herding behavior in the financial markets. The main objective is to assess the potential connection between ESG ratings and investor herding. As ESG investing has gained popularity in the last decade, it is interesting to explore whether investors' decisions are based on sustainability considerations or driven by market trends and social influence.

Specifically, the aim is to determine whether ESG scores serve as a trigger or an amplifier for herding behavior. Furthermore, if this leads to herd mentality, causing investors to imitate the actions of others. It also examines whether ESG scores are associated with reduced or intensified herding, offering insight into the behavioral mechanisms behind sustainable investing. By analyzing the relationship between ESG ratings and herding behavior, this thesis addresses the topical issue of the rationality and efficiency of ESG investing and the behavioral risks regarding sustainable investing.

In addition, this thesis also explores whether herding behavior can be seen more extensively in times of market uncertainty, such as the COVID-19 pandemic. Previous research has examined the intensification of herding during times of market uncertainty. The dataset from European stock markets provides an excellent opportunity to explore this further. This thesis examines whether COVID-19 accelerated herding behavior in the European stock market.

## **1.2 Research Hypotheses**

The thesis examines the possible connection between ESG performance and herding behavior in European equity markets, in addition to the impact of COVID-19 on herd

behavior. Building on prior literature in herding and ESG investing, the hypotheses aim to explore whether ESG ratings contribute to coordinated investor behavior.

The underlying assumption is that ESG scores may act as a signal or a “shortcut” in decision-making for investors who value sustainability criteria in their portfolios (Benz et al., (2020). If the concentration of investments results in a smaller set of highly rated companies, this behavior can reduce the diversity of investment options, leading to increased similarity in movements among high-rated ESG stocks.

Previous research indicates that herding towards highly rated ESG stocks may also result from less experienced investors following the leads of more experienced investors (Przychodzen et al., 2016; Benz et al., 2020; Rubbaniy et al., 2021).

Existing research suggests that herding may be more robust in times of financial uncertainty and investors are more prone to rely on observable signals and the actions of others. ESG ratings may be seen as a relatively safe and trusted metric, reinforcing collective investment behavior. Rubbaniy et al. (2021) find strong signals of herding during the pandemic. This is also supported by Gavrilakis and Floros (2023), who found ESG herding in the stock markets in Greece and France, but correspondingly, part of the market did not provide evidence.

$H_1$ : Companies with higher ESG scores demonstrate reduced cross-sectional return dispersion, indicating that highly rated companies exhibit herding behavior among investors.

The first hypothesis suggests that companies with high ESG scores may exhibit lower cross-sectional absolute deviation (CSAD) in their returns compared to companies with lower ESG scores. A lower CSAD suggests that an individual stock's returns are clustered more closely around the market return, which can be interpreted as a sign of herding. The effects are expected to be stronger in stocks with higher ESG performance.

$H_2$ : Herding behavior is stronger during COVID-19

The second hypothesis proposes that herding behavior intensifies during periods of heightened uncertainty, such as the COVID-19 pandemic. In times of financial uncertainty, market participants may rely more heavily on the observed actions of others instead of their private information. This aligns with herding theories, which suggest that uncertainty or fear can amplify reliance on group behavior, ultimately increasing the likelihood of herding (Bikhchandani et al., 1992; Devenow & Welch, 1996). This collective behavior may result in price fluctuations detached from fundamentals and reflect group sentiment rather than investor analysis.

Previous literature presents evidence of financial crises disrupting traditional valuation models, causing investors to rely on observable market trends. This behavior may lead to herding behavior, especially in volatile environments where accurate information is scarce. Research by Rubbaniy et al. (2021) and Gavrilakis and Floros (2023) supports this view, demonstrating increased herding behavior in European and U.S. stock markets during the COVID-19. On the contrary, Bogdan et al., (2022) find no evidence of herding during the pandemic.

These hypotheses will be tested empirically using daily return data from Euro Stoxx 50 companies between 2020-2022. By applying the CSAD methodology by Chang et al., (2000) and extended by Gavrilakis and Floros (2023).

The differences in research outcomes make this an intriguing topic for further exploration. Results are inconsistent globally and in Europe. This study seeks to answer the open question of whether the phenomenon is observable in European stock markets.

### **1.3 Structure of the Study**

The structure of the study is as follows. The first chapter introduces the topic, the purpose of the study, and the research hypotheses. The second chapter provides a theoretical background for the study by comparing behavioral finance theories with traditional theories. The third chapter introduces literature on ESG and herding behavior. The fourth chapter presents the data, methodology, and descriptive statistics of the thesis. The fifth chapter discusses the empirical results and their limitations. Finally, the sixth chapter concludes with the findings, practical implications, and opportunities for future research.

## **2 Theoretical Background**

Understanding how herd behavior opposes fundamental finance theories is necessary to analyze herd behavior and its impact on the financial market. This chapter will create a theoretical framework by first introducing traditional finance theories, followed by a theoretical background of herding from the behavioral finance perspective.

Traditional financial theories are based on investors' rational decision-making to maximize expected utility. Behavioral finance argues that financial phenomena can be better understood when assuming that not all agents are entirely rational (Barberis & Thaler, 2002). This opposes the traditional finance paradigm.

### **2.1 Traditional Finance**

Traditional finance theories are based on investor rationality. The theoretical framework introduced in this chapter is The Efficient Market Hypothesis (EMH) (Fama, 1970), CAPM (Sharpe, 1964), and the Three-Factor Model (Fama and French, 1992;1993;2015), which suggest that prices reflect all available information and that investors make decisions by maximizing expected utility. This chapter then discusses how behavioral finance opposes these traditional theories.

#### **2.1.1 Efficient market hypothesis**

The efficient market hypothesis, introduced by Fama (1970), is one of the central propositions of finance. The theory defines that all security prices reflect all available information entirely and reliably. The fundamental prerequisite of the theory is that

investors use all available information to make decisions. As a result of this, security prices reflect their fundamental values. The theory proposes that financial markets are informationally efficient, considering that asset prices reflect all available information.

Fama (1970) stated three key assumptions that the efficient market hypothesis relies on:

1. Investors act rationally to maximize utility based on available information
2. All available information is free and available to all market participants
3. There are no arbitrage opportunities; rational investors remove arbitrage opportunities created by irrational investors.

These assumptions are met in a perfect financial market. Nonetheless, these prerequisites for successful financial markets are unrealistic in reality. The theory acknowledges the deficiencies and claims that markets can function efficiently, even imperfectly. According to Shleifer (2000) and the EMH hypothesis, markets remain efficient, even though investors behave irrationally.

Fama (1970) introduced the model of dividing EMH into three categories according to the information that prices reflect: weak-, semi-strong-, and strong form of efficiency.

In the weak form of efficiency, equity prices include historical information, e.g., trading volume and price development. According to Fama (1970), technical analysis cannot generate excess returns. The stock market has no memory, meaning historical patterns do not produce easily identifiable or consistent return trends. Fama (1970) argues that stock prices are inherently unpredictable, causing future price movements to follow a random walk (Shleifer, 2000, p. 6). Therefore, investors are not able to use any investment strategies that lead to abnormal earnings.

The semi-strong form of market efficiency states that equity prices reflect all publicly available information, including current and historical data. According to Fama (1970),

when semi-strong efficiency holds, publicly accessible information, e.g., financial statements, profit forecasts, and dividend policies, is already incorporated into current share prices. As a result, fundamental analysis becomes ineffective for predicting future returns, as all relevant public information is immediately factored into the price (Knüpfer & Puttonen, 2016, p. 165).

In the strong form of efficiency, stock prices incorporate all information, including historical data, publicly available information, and private, unpublished insights. Stock prices respond instantaneously and with appropriate magnitude to any information impacting valuation. In this form of efficiency, no group has exclusive access to insider information, so investors cannot achieve excessive returns with private information (Shleifer, 2000, p. 7).

EMH is a highly valued model used as a framework for finance studies about market efficiency and asset pricing. However, in the last decades, researchers have conducted studies showing that human rationality is observable, which does not support EMH. Researchers have acknowledged that psychological and sociological factors influence investors' behavior in stock markets. Behavioral finance has also indicated several anomalies, e.g., herd behavior, that do not comply with EMH.

### **2.1.2 Capital Asset Pricing Model**

The Capital Asset Pricing Model (CAPM) assesses the linear relationship between systematic risk and the expected return on stocks. Established by William Sharpe (1964), CAPM determines the long-term average return for a security. The modern portfolio theory, introduced by Markowitz in 1952, laid the groundwork for CAPM. The model is

based on the idea that investors can expect greater returns by taking on more risk, or vice versa.

Diversification is used to mitigate risks by maintaining a variety of securities in portfolios. By doing this, the only risk faced is systematic risk, which consists of market-wide factors, including interest rate, currency risk, and commodity risk.

Systematic risk is measured by beta (Knüpfer & Puttonen, 2016, p. 148). Investors demand risk compensation, and since systematic risk is the only risk, they face according to the CAPM, this is the risk upon which they require a return. Stock returns reflect the overall return expectations of investors in relation to systematic risk, or beta. This is the foundation of the Capital Asset Pricing Model (CAPM). The CAPM equation is presented below:

$$E(r)_a r_f + \beta_a (r_m - r_f) \quad (1)$$

Where:

$E(r)_a$  = expected returns of the asset

$r_f$  = risk-free rate

$\beta_a$  = beta of the security

$(r_m - r_f)$  = market premium

The model assumes that investors behave rationally and seek to maximize profits. However, CAPM faces criticism regarding its underlying assumptions. Transactional costs exist in the financial world, and agents' investment periods vary. CAPM does not consider that the markets are not perfectly efficient and that decision-making is influenced by various cognitive biases.

### 2.1.3 Three-factor model

The three-factor model introduced by Fama and French (1992, 1993, 2015) and Jegadeesh and Titman (1993) is an extension of CAPM. This extension of the model aims to describe the stock returns with more factors than the standard CAPM, which inaccurately measures the returns of values. Asset returns cannot be adequately explained or priced using the market premium factor for CAPM alone. Therefore, Fama and French incorporated two additional factors that consider the company's size and value. The size factor, known as Small Minus Big (SMB), considers how a company's size influences its returns. In the past, small-cap companies have had higher returns than large-cap companies. The factor is determined by computing the variance in stock returns between small and large companies (Fama & French, 1993).

The value factor explains how a company's value affects expected returns. High Minus Low (HML) assesses the difference between low and high book-to-market value. In the past, higher book-to-market value companies (value companies) have had significantly higher returns than low book-to-market value companies (growth companies) (Fama & French, 1993). The HML factor calculates the difference of returns between high and low book-to-market value companies. The equation for the three-factor model is represented below:

$$E(r)_a = r_f + \beta_a(r_m - r_f) + \beta_b(SMB) + \beta_c(HML) + e_i \quad (2)$$

Where in addition to CAPM equation:

$\beta_b$  = sensitivity of asset to SMB

(SMB) = Small Minus Big factor

$\beta_c$  = sensitivity of asset to HML

(HML) = High Minus Low factor

$e_i$  = zero-mean residual

#### **2.1.4 Behavioral Finance Opposing Efficient Markets**

According to traditional financial theories, investors are rational and base their choices on maximizing the expected utility. Central assumptions include rational decision-making, portfolio theory, and the Efficient Market Hypothesis (EMH), which presumes asset prices reflect all available information. However, Barberis and Thaler (2002) empirical data proves that many of the presumptions of classic finance theories are not valid in practice.

Contrary to the traditional finance paradigm, behavioral finance argues that agents do not always act rationally. The underlying premise is that cognitive biases and characteristics of other market participants influence market participants' investment decisions. Behavioral finance attempts to explain the two contradictions: the limits of arbitrage and the psychological factors influencing financial decision-making (Barberis & Thaler, 2002).

Traditional asset pricing models, such as CAPM, Fama, and French's three-factor model, assume that investors hold diversified portfolios passively and that the expected returns follow a linear pattern. The momentum strategy by Chan et al. (1996), and the contrarian strategy, developed by De Bondt and Thaler (1985), present challenges to the traditional notions of rational utility maximization and the assumption that asset prices accurately reflect their intrinsic value. These strategies highlight behavioral biases and market inefficiencies, suggesting that investor behavior can deviate from what is predicted by traditional theories. More frequent investment actions can lead to fluctuations in equity prices, which CAPM and other asset pricing models cannot reliably predict (Lakonishok et al., 1992).

Benarzi and Thaler (1995) further suggest that certain market anomalies result from investors' irrational behavior. These findings directly contradict the assumption of consistent utility-maximizing.

Critiques of Efficient Market Theory led Fama (1998) to justify the theory further by suggesting that frequently occurring anomalies cancel each other out in efficient markets due to inconsistency. If market anomalies were exploitable, rational agents would exploit the arbitrage, restoring market efficiency. Behavioral finance challenges this assumption by demonstrating that psychological biases can lead to systematic mispricing in the financial markets.

Sheifler and Vishny (1997) introduced the concept of limits to arbitrage. They argue that even if mispricing exists, rational agents may be unable to eliminate it due to risks and limitations, allowing inefficiencies to keep occurring. This contradicts Fama's (1998) argument that anomalies cancel each other out or disappear due to arbitrage. As Barberis and Thaler (2002) emphasize, transaction costs limit the possibility of utilizing arbitrage opportunities and therefore support the limits to arbitrage.

## **2.2 Behavioral Finance**

This sub-chapter reviews earlier studies on herd behavior in the financial markets. The analysis focuses on the definition of herding, its different forms, underlying reasons, and its relevance to ESG investing.

### **2.2.1 Herding Behavior**

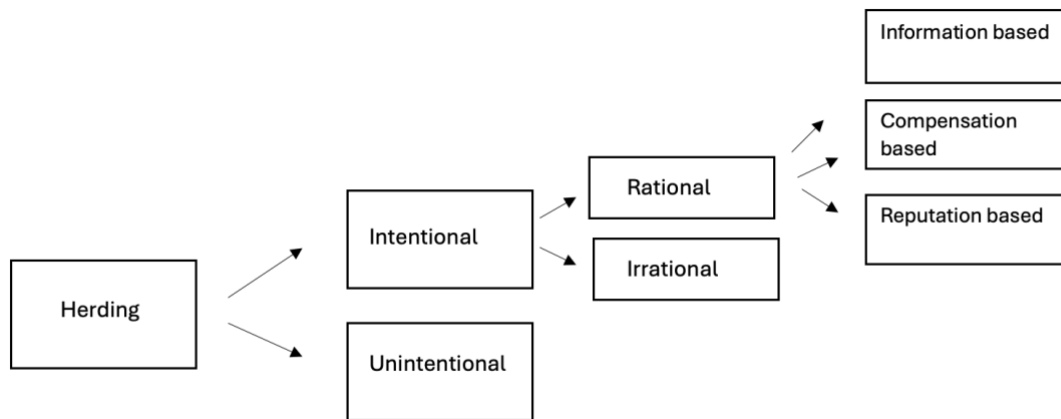
To understand herd behavior, it is important to understand that the word originates from biology. Herd behavior does not only occur in the financial market; initially, herding refers to animals. Originally, herding refers to animals moving as a pack. This approach can be applied to humans and financial theory. According to Devenow & Welch (1996), imitation and mimicry are two of the most fundamental instincts of a human. Rational individuals can participate in herd behavior by taking others' opinions into account, even though they recognize the herd mentality around them (Shiller, 2005). Herd behavior as a part of behavioral finance has been studied extensively and has many definitions in the literature.

The financial phenomenon of herding has been recognized since the 1990s, though indicators of herding could already be seen in John Maynard Keynes' 1936 study. Keynes (1936) introduces a theory of a *Keynesian beauty contest* that explains price fluctuations in stock markets. The theory presents that the judges of the "beauty contest" select the most popular face instead of their personal favorite. The observation suggests that agents prefer to be conventionally mistaken than unconventionally correct. There is safety in the numbers; individuals maintain a good reputation by following others. The study argues that financial speculation is affected by sociological factors and follows a similar process to the Keynesian beauty contest. Keynes (1936) argues that social conventions influence market participants and tend to mimic others' behaviors during uncertain times. Consequently, investors value stocks based on what other investors consider the value of a stock to be in the market instead of the actual value.

The literature defines and explains the phenomenon of herding in many ways. Investor herding is studied to be caused by informational cascades, reputation concerns, or payoff externalities. This study will focus on information-based herding and how ESG ratings can be linked to this behavior.

### 2.2.2 Types of Herding

Numerous theories and distinctions explain the reasons behind herding. Bikhchandani and Sharma's (2000) theory is the most well-known, distinguishing rational and irrational herding. Figure 1 illustrates the categorization of different types of herding.



**Figure 1.** Divisions of herding (Bikhchandani & Sharma, 2000).

The key distinction in classifying herding behavior is whether it is rational or irrational (Bikhchandani & Sharma, 2000). Rational herding occurs when investors choose to follow the crowd despite being rational decision-makers. In contrast, irrational herding results from cognitive biases, emotions, and non-fundamental factors.

Herd behavior results from an investor's intent to copy the behavior of others and follow the trend (Bikhchandani & Sharma, 2000). This intentional herding must be distinguished from unintentional herding, also called spurious herding. This is an outcome where investors face similar decision problems, and similar information leads to similar results. Although the study points out that empirically distinguishing these two types of herding from each other may be impossible, since multiple factors affect an investment decision

According to Bikhchandani and Sharma (2000), rational herding is divided into three subcategories, which explain the reasons behind it. These are information-based herding and cascades, concern for reputation, and compensation structures. This thesis will focus on the first two.

### **2.2.2.1 Information-Based Herding**

Banerjee (1992) states that herding is a rational response to uncertainty. Individuals choose to follow others when they assume that they have superior information. This leads to informational cascades, where independent decision-making ceases. This type of herding is based on individuals' believing that other agents in the financial markets have a more proficient insight into the market conditions. Therefore, individuals follow the observed trends, even if their private information suggests otherwise. Banerjee (1992) suggests that this can be seen among investors who enter the market at a later stage since they may conclude that previously involved investors have private or superior information.

Bikhchandani and Sharma (2000), explain the fragility of herd behavior. Investors can observe others' actions but not the private signals they act on. Investors may conclude others' private information based on their actions if they have a certain view about the appropriate course of action. Further, herding behavior is idiosyncratic in that the conduct that investors herd is determined by a combination of random events and the choices made by the first few individuals.

Bikhchandani, Hirshleifer, & Welch (1992) expanded the idea of informational cascades. They suggest that investors make sequential decisions and observe the choices of those before them. According to the study, the first agent receives a positive signal and invests. The second agent receives a negative signal but sees the first agent buying, assuming they have better information, and also buys. The third agent observes the first two investing, so they disregard their private information and make a purchase. This process

leads to a herding effect where agents follow the decisions of others, regardless of new information.

Earlier herding models assume that agents herd due to the belief that an asset is over- or undervalued. Avery and Zemsky (1998) develop the theory further by presenting multiple sources of uncertainty that lead to herding. Sources of uncertainty include fundamental value uncertainty, market sentiment uncertainty, and signal precision uncertainty. The study finds that agents are more likely to rely on public signals when the information structure is complex.

#### **2.2.2.2 Reputational Herding**

In the subcategories of rational herding, Bikhchandani and Sharma (2000) also identify reputational herding, which is particularly evident among institutional investors. Reputational herding occurs when institutional investors mimic investment decisions of others due to career concerns.

The foundational theoretical model of reputational herding was developed by Scharfstein and Stein (1990), and it suggests that career concerns can drive institutional investors to engage in herding. The study argues that institutional investors often mimic others' investment decisions because being incorrect as part of the group is safer. Deviating from the consensus in their investment strategy and performing poorly means they risk losing credibility or their job.

Hirshleifer and Teoh (2003) elaborate on this concept in their research, indicating that informational herding is driven not only by superior information but also by social and reputational considerations. This is particularly evident among institutional investors when deviating from the consensus could damage their credibility. Analysts and fund

managers tend to prefer making mistakes collectively rather than being mistaken individually, even if they possess superior private information.

Lakonishok, Shleifer, and Vishny (1992) challenge the assumption that institutional investors are rational and examine how their trading patterns contribute to market inefficiencies. The study states institutional investors engage in herding, especially by following previously well-performed stocks and avoiding contrarian strategies. Engaging in trend-chasing may reinforce stock price movements, contributing to momentum effects.

Lakonishok et al. (1992) suggest that institutional investors avoid contractionary strategies that expose them to underperformance. Institutional herd behavior can reinforce stock price trends and contribute to momentum effects. The study indicates that by following trends rather than countering them, institutional investors may exacerbate mispricing instead of correcting it. This may increase mispricing instead of resolving it, which could result in inefficient markets.

### **3 Literature Review**

Previous research demonstrates inconclusive results regarding ESG herding and herding during COVID-19. In this chapter, a literature review will be conducted to understand the hypotheses built in the introduction and the following empirical chapters. This chapter will first introduce the concepts of Corporate Social Responsibility (CSR) and ESG, followed by a review of previous research related to herd behavior in the context of ESG performance and the coronavirus pandemic.

#### **3.1 Foundations of Corporate Social Responsibility**

This chapter will introduce the concepts of Corporate Social Responsibility (CSR) and Socially Responsible Investing (SRI). Understanding these concepts is essential for this thesis, as they are closely linked to the concept of ESG, which is a key variable in analyzing herding behavior.

##### **3.1.1 Corporate Social Responsibility**

Before understanding socially responsible investing (SRI) and ESG, the definition of Corporate Social Responsibility (CSR) must be introduced. CSR is a wide-ranging concept that varies across companies and industries and has developed over time. According to the European Commission (2011, p. 3), CSR is *“the responsibility of enterprises for their impacts on society.”* It is businesses’ self-regulation that contributes to being socially accountable to stakeholders.

The idea of CSR emerged in the late 1950s and early 1960s, when large corporations emerged (Bowen, 2014). Howard Bowen theorized the concept, arguing that companies should contribute to society. On the contrary, Milton Friedman (1970) famously argued against CSR by stating that a company's only responsibility is to maximize shareholder value.

Today, CSR has evolved into a core business function along with Environmental, Social, and Governance (ESG) criteria. Companies adopt a more responsible and conscious approach due to a combination of external and internal factors. Externally, regulatory requirements, competitive dynamics, and shifts in consumer preference can require strategic adjustments. Internally, factors such as employee engagement and customer demand are essential in influencing a company's financial performance and viability.

### **3.1.2 Socially Responsible Investment**

Socially responsible investment (SRI) is an investment strategy that considers social, ethical, and environmental consequences of investment (Renneboog, L., Ter Horst, J., & Zhang, C, 2008). Strategy integrates social values and moral considerations into portfolio selection (Statman, 2000). Although the concept of SRI is very multidimensional, its adaptation can vary across investors. Sustainable and responsible investing has several nominations that are reciprocally connected and overlap to some extent. The concepts include, e.g., SRI, social investing, green investing, socially conscious investing, and ethical investing. These terms are often used interchangeably, referring to the process of prioritizing ethical concerns, including social and environmental challenges, alongside maximizing profits.

Responsible investing has gained popularity in the 21<sup>st</sup> century due to shifted consumption habits and increased interest in corporate responsibility. Institutional

investors incorporate SRI practices into their portfolio selection (Oh, Park & Gauri, 2013). Consequently, SRI will be integrated into companies' CSR practices.

Kinder (2005) categorized socially responsible investors into three approaches: value-based investors, value-seeking investors, and value-enhancing investors. Value-based investors are motivated by their moral beliefs. Their investment decisions reflect their beliefs, even if they compromise maximizing financial returns. Value-based investors may avoid harmful companies or industries that are inconsistent with their principles.

Value-seeking investors utilize social and environmental data to improve the performance of their portfolios (Oh et al., 2013). These investors integrate ESG data into their financial analysis and make evidence-based decisions. They may utilize positive screening and select best-in-class options, believing ESG attributes will drive future growth and resilience. Value-enhancing investors use shareholder activism to shape corporate behavior and improve investment value (Kinder, 2005). This may include shareholder engagement and proxy voting. Value-enhancing investors are usually public and pension funds.

### **3.2 Environment, Social, Governance (ESG)**

SRI is a general term that refers to responsible investing, where the ESG criteria offers a broader framework for assessing a company's sustainability. ESG implements three key factors: environmental, social, and governance. ESG criteria establish standards for companies that investors evaluate and utilize in their investment decisions. Historically, the awareness of ESG issues is observed to have begun with the exclusion of "sin stocks" (Capelle-Blancard & Petit, 2019).

According to the Global ESG Survey 2023 by BNP Paribas (2023) 90 % of institutional investors have incorporated ESG into some parts of their portfolios. Morgan Stanley's Sustainable Signals Report of individual investors (2025) reveals that 88% of investors

worldwide are interested in sustainable investing. Meanwhile, 40% of European retail investors expect stronger financial returns from sustainable investments than traditional investments.

Climate change is the most dominant theme, and investment emphasis can be seen in clean energy and carbon reduction. Socially conscious investors use ESG factors to examine the potential risks and how the companies are prepared for different sustainability issues. ESG consists of the following dimensions:

Environmental factors (E) include e.g. climate change, resource scarcity, species diversity, greenhouse gas emissions, waste and pollution, and deforestation (Friede, Busch & Bassen, 2015). Environmental concerns are gaining prominence as the impact of exceptional climate phenomena such as wildfires, floods, heat waves, and hurricanes intensifies. Companies that neglect their environmental impact may face a larger financial risk. A company that disregards how its operations affect the environment may consequently harm its reputation and expose itself to regulatory sanctions or criminal charges. The most extreme example of this is the Deepwater Horizon oil disaster in the Gulf of Mexico in 2010, which cost the oil company BP at least 61,6 billion US dollars (National Oceanic and Atmospheric Administration, n.d.).

Social responsibility (S) covers, e.g., human rights, humanitarian crises, health and safety, and working conditions, including slavery and child labor. This factor focuses on the impact on people within and outside the organization. This includes how a firm treats its employees, ensures workplace safety and well-being, the management of customer relationships, and the engagement with local communities (Kocmanová & Dočekalová, 2013). Social issues have gained attention recently, often becoming a reputational risk to companies. An example of a social crisis is the 2013 Rana Plaza garment factory collapse in Bangladesh, which killed 1,134 people. The incident highlighted the labor issues in global supply chains and provoked debate about global brands' sourcing practices (Manik & Yardley, 2013). However, the social dimension of ESG is the most

challenging for stakeholders to assess due to its qualitative character, despite its significance (UN PRI, 2017).

Governance (G) includes the factors of the company's management e.g. salaries, corruption, bribery, board diversity, and independence. This refers to the internal controls and systems of how a company is directed and overseen. Long-term financial viability and maintaining investor trust rely on effective corporate governance. According to Clark, Feiner, and Viehs (2015), well-organized corporate governance guarantees accountability for leadership and ensures stakeholders that decisions are made with their interests in mind. On the contrary, inadequate governance can leave businesses vulnerable to misconduct, legal violations, and harm to their reputation. The Volkswagen emissions scandal is a prominent example of governance gone wrong. In addition to causing over \$30 billion in fines and car recalls, the company's reputation was severely damaged due to the intentional manipulation of emissions testing software (Hotten, 2015).

### **3.2.1 ESG Score**

Several international rating agencies, such as Bloomberg, Morningstar, and Refinitiv, produce ESG scores. Scoring involves a combination of data provided by the company, observations from third parties, and analysis conducted by the rating agency. ESG scores can differ significantly depending on the source, since rating agencies use different metrics and assessment models. Scoring is not standardized since indicators measuring, e.g., emissions or work safety differ (Christensen, Serafeim & Sikochi, 2022).

The methodology for constructing ESG scores varies depending on the rating agency; however, it typically entails aggregating diverse indicators that are subsequently weighted and consolidated into a final score (Berg, Kölbel & Rigobon, 2022). Indicators are selected for relevant ESG issues specific to each industry, and the data includes

publicly available information, proprietary data, or third-party datasets. Each metric is then normalized or scaled to enable comparison across companies in different fields of industries. Agencies use their proprietary methodologies to assign scores in scales, e.g., 0-100 or AAA-CCC. Sub-scores for E, S, and G components are calculated and often weighted differently depending on industry relevance.

Despite the growing significance of ESG ratings, academic studies have revealed various methodological challenges and limitations. Berg et al. (2022) highlights the significant differences in the methodologies used by different rating agencies. The low correlation between agencies' ESG ratings for the same company highlights the inconsistency of evaluation criteria. Billio et al., (2021) also study subjectivity and inconsistencies in weighting. Assigning different weights to ESG indicators introduces subjectivity to the ESG ratings.

Kotsantonis and Serafeim (2019) examine the ratings' lack of transparency, which may make it difficult for investors to fully comprehend what the score represents or how it was derived.

The data behind ESG scores is partly constructed by the companies' disclosures, which may vary in quality, completeness, and accuracy. Chatterji, Levine, and Toffel (2009) find a self-reporting bias in which companies with better resources may produce better disclosures regardless of the actual ESG performance.

### **3.2.2 Relationship Between ESG and Financial Performance**

The relationship between financial performance and ESG scores has been extensively studied in both academic research and practical applications. Overall results indicate that high ESG scores are often associated with positive financial outcomes, particularly

over the long term and when examining risk-adjusted returns (Giese et al., 2019; Friede, Busch & Bassen 2015)

From a risk management perspective, Giese et al., (2019) find that companies with higher ESG scores are less exposed to risks, less prone to sudden value drops, and generate better risk-adjusted returns. This may suggest that ESG factors can make portfolios more resilient by reducing volatility and increasing stability.

Friede et als., (2015) meta-analysis of 2000 empirical studies synthesize a neutral or positive connection between ESG factors and financial performance. Strong evidence suggests a long-term positive impact on investors that ESG factors can function as a mechanism for enhancing portfolio resilience.

The resilience of ESG is demonstrated during the COVID-19 market crash. According to Albuquerque et al., (2020), companies with higher ESG scores were significantly more resilient, preserving their market value more effectively compared to companies with lower ESG ratings.

ESG-oriented companies tend to have lower costs of capital and better profitability in the long run (Eccles, Ioannou & Serafeim, 2014; Cheng et al., 2014; Khan, Serafeim, Yoon, 2016). A sustained commitment to sustainability also mitigates the long-term externalities of investment assets on the natural and social environment.

In addition to improved market-based outcomes, Fulton, Kahn, and Sharples (2012) show a strong accounting-based performance. This indicates that ESG may provide value not only in stock performance but also in operational efficiency. In contrast, the research conducted by Auer and Schuhmacher (2016) indicates that ESG indices do not outperform on average. Nevertheless, these indices are associated with an enhanced risk profile and exhibit lower volatility.

### **3.3 ESG Herding**

As covered in the previous chapter, herding in the financial markets is driven by informational asymmetries where investors rely on public signals instead of their independent analysis. ESG investing can provide a conducive environment for information-based herding due to ESG ratings' multidimensional and subjective characteristics. The subjectivity of the ratings increases the likelihood of investors' collective behavior instead of conducting independent opinions of companies' sustainability performance. The combination of market psychology, reputational incentives, and ESG rating uncertainty amplifies herding tendencies.

#### **3.3.1 Drivers of ESG Herding**

According to Avery and Zemsky (1998), multiple sources of uncertainty can lead to herding in the financial markets. The issue can be illustrated by ESG ratings, which include complex and non-standardized criteria across three different dimensions – environment, social, and governance. A company's ESG score is composed of several qualitative assessments and may vary across rating agencies. Investors' uncertainty of whether ESG rating accurately reflects true sustainable performance, compliance with laws and regulations, or is merely a product of market hype or sentiment. This may lead to investors finding it challenging to differentiate genuine sustainability performance from market-driven perception. Consequently, leading to herding behavior, where investors choose highly rated ESG firms when they believe that others have superior information, despite inconsistencies in the rating methodology. As a result, there is an excess demand for highly rated ESG stocks, which may lead to distorting prices and misallocating capital.

This phenomenon aligns with Bikhchandani et al.'s (1992) concept of informational cascades, where investors disregard private signals and follow trends. In the ESG context, this can be implied that once a few investors interpret a high ESG rating as an investment signal, others will follow. This reinforces market momentum regardless of the company's sustainability performance.

According to Hirshleifer and Teoh (2003), herding may also be due to reputational concerns. This can be directly applied to ESG investing since institutional investors may feel the pressure to follow the ESG trends to maintain credibility. The publication of ESG scores may reinforce herding behavior as transparency can be seen as an indicator of superior performance, despite the actual impact. When influential market participants adopt ESG investment strategies, others may imitate in a cascading effect. This results in an increased demand for ESG assets and reinforces market momentum. Simultaneously, the increasing emphasis on ESG considerations may drive investors to add ESG assets to their portfolios as a form of individual commitment without rational diversification. This can act as fuel for herding, resulting in significant capital inflows into ESG assets and creating a market bubble.

Reputational incentives amplify the ESG rating biases, and firms may concentrate on optimizing their score instead of implementing sustainability improvements. A high ESG score attracts investor inflows, reinforcing a continuous cycle of ESG-driven herding. This aligns with Graham's (1999) findings that inexperienced institutional investors are more prone to herding when concerned about their reputation. Similarly, Anderson and Holt (1997) found that less-experienced investors were more likely to ignore their private signals and herd towards market trends. This may suggest that informational cascades in ESG investing may be fueled by both institutional and individual investors.

ESG ratings may act as a simplified heuristic, leading to investor herding. Investors overweight the high-rated firms and underweight the low-rated firms, even when the fundamental information does not support this. Herding increases market volatility

because agents believe other investors have superior information, causing prices to overreact to news. This may result in asset price bubbles from investors misinterpreting market fluctuations as signals of superior information. This aligns with the results by Banerjee (1992), where investors follow the trends even if their private information contradicts it.

Due to inconsistent rating methodologies, ESG rating agencies may worsen market distortions and solidify herd behavior.

### **3.3.2 Empirical Evidence on ESG Herding**

Recent empirical research in ESG investing reflects the growing interest in sustainability factors in financial decision-making. The growing demand for ESG stocks may drive individual investors and fund managers to herd (Przychodzen et al., 2016; Benz et al., 2020; Rubbaniy et al., 2021).

Przychodzen et al., (2016) suggest institutional investors often herd towards ESG stocks within the same community. Less experienced fund managers follow the lead of more experienced fund managers, who first adjust their investments based on ESG issues and are seen as leaders. This behavior may be motivated by reputational concerns or a lack of confidence in assessing ESG capabilities. This is consistent with Graham's (1999) earlier findings that less experienced investors are more likely to mimic the actions of perceived market experts. Przychodzen et al. (2016) suggest that behavior may also be accidental in homogeneous groups of fund managers. Specific geographic regions or asset management groups may herd unintentionally due to shared information sources and decision-making frameworks.

Benz et al., (2020) analyze the emerging trend of decarbonization of institutional portfolios and find indicators of herding. Investors buy green stocks and sell brown stocks by following the decarbonization of others' portfolios. Analysis indicates that institutions

may be guided not solely by regulatory frameworks but also by the behaviors and decisions of their peer institutions. The incentive behind this may also be intentional and spurious due to reputational concerns. This may be due to analysts trying to maintain legitimacy and avoid negative public scrutiny. It is suggested that herding behavior does not necessarily correlate with the fundamental underlying factors but rather reflects a trend in investment that is reinforced socially.

ESG herding appears to be particularly significant during periods of elevated market volatility. Rubbaniy et al.'s (2021) findings focus on extreme market conditions, which indicate ESG herding during the COVID-19 pandemic. The study demonstrates a significant increase in investment flows into ESG-oriented assets during the crash and subsequent recovery in 2020. ESG assets are regarded as more stable and resilient. The findings suggest that behavior was influenced not by risk-return factors but by non-fundamental signals, such as the increasing popularity of ESG narratives in public discourse.

Rubbaniy et al. (2021) also report herd behavior in bull and bear market conditions in ESG stocks in the U.S. Findings indicate that ESG herding may not only be a response to temporary shocks in the financial markets, but also a more persistent phenomenon. The findings align with a key concept from social psychology - uncertainty avoidance (Hofstede, 2001), where in some extent, everyone avoids ambiguous or unpredictable outcomes. The findings also align with Banerjee's (1992) theory of desire for social conformity, which refers to the tendency to align behavior with others.

On the contrary, D'Hondt et al. (2022) found that investors may consider ESG investments as luxury goods during financial turbulence and avoid them. They present contrasting evidence during the COVID-19 pandemic, when investors moved away from ESG investments. Their findings suggest that in times of uncertainty, some investors see traditional investments as safer and deprioritize ESG considerations.

Gavrilakis and Floros' (2023) study examines the ESG ratings as a herding signal, which this thesis also aims to examine. Investors rely on the ratings provided by third-party agencies to inform their investment decisions however, ESG scoring lacks universally accepted standards. The study indicates a correlation in trading behavior among stocks with ESG ratings. Findings raise questions about whether ESG herding may create inefficiencies or ESG-related asset bubbles. When several investors adjust their portfolios based on improved ESG scores, others may follow the current trend. This can be especially seen if market valuations are used in the models of ESG scoring.

### **3.4 Herding During COVID-19**

Previous research examines how herding occurs under extreme market conditions. Christie and Huang (1995) and Chang et al., (2000) discover that during market uncertainty, investors tend to mimic the actions of others and disregard their private information. Theoretically, herd behavior is consistent with the theory of informational cascades (Bikhchandani et al., 1992), when uncertainty causes individuals to follow the majority. However, despite the reasonable hypothesis about increased herding during periods of market stress, the research findings have been inconsistent.

The outbreak of the COVID-19 pandemic in early 2020 developed a chain of events that led to significant financial volatility and investor anxiety (Zhang et al., 2020). It slowed down economies, disrupted supply chains, and created widespread uncertainty about future earnings and global recovery. This timeframe of turbulent market events offers a fertile ground to examine herding, as financial crises are often associated with panic in investors, leading to irrational decisions. Previous research demonstrates that investor fear and anxiety are the key drivers of the observed market turbulence (Al-Awadhhi et al, 2020; Zhang et al., 2020). Under these conditions, less informed investors may follow the more informed market participants, due to fear and anxiety.

Espinosa and Arias (2020) find strong evidence that COVID-19 increased herding in the European capital markets. The results indicate that less informed investors followed more informed ones, which led to the markets acting homogenously. Similarly, strong herd behavior was observed during and after the lockdown in the U.S. stock market (Rubbiani et al., 2021). The results suggest a prolonged behavioral shift rather than a temporary reaction.

On the other hand, several studies contradict this view. Yarovaya et al., (2021) study herding in cryptocurrencies during the pandemic and found no signs of herding, despite the strong theoretical expectations. Similarly, Ferreruela and Mallor (2021) find no evidence of herding in the European stock market during the pandemic.

Bogdan et al., (2022) compare developed, emerging, and frontier markets prior and during COVID-19. Herding behavior was not present in the developed markets, but it was observed in the emerging and frontier markets. The research highlights the importance of market maturity and how different environments shape behavioral responses during crises.

The diverging results of previous research highlight how different markets and geographical areas seem to be affected differently, e.g., the prevalence and impact differ in developed and emerging markets (Bogdan et al., 2022). Previous research shows divergent results on whether COVID-19 amplified herding behavior. This highlights the complexity of herding behavior and the necessity to consider contextual factors when analyzing investor behavior during crises.

## 4 Data and Methodology

This chapter begins the empirical part of this thesis. It presents the data and methodology used. Multiple linear regression models are constructed to test the hypotheses, and lastly, descriptive statistics are introduced.

### 4.1 Data Description

The data of this study consists of ESG scores for listed companies in the EURO STOXX 50 index and stock price data from 1.1.2020 to 31.12.2022. Data has been collected from the Refinitiv Datastream database. The EURO STOXX 50 is a highly valued blue-chip index that includes the 50 largest and most liquid companies in the Eurozone (Stoxx, n.d.). The index covers companies from Eurozone countries like Germany, France, and the Netherlands, and includes a broad range of sectors. Notable companies in the index are, for example, LMHV, Siemens, SAP, and Nokia.

The companies included in the index are typically market leaders within their respective sectors, and therefore, the index reflects the health and dynamics of the Eurozone's biggest economies. The stocks are heavily traded blue-chip companies, demonstrating high liquidity and market efficiency, which makes them ideal for studying market behavior like herding. The index includes diversified representation across sectors, such as tech, finance, and consumer goods. By increasing representativeness, diversification enhances the relevance of the findings to the broader European market.

EURO STOXX 50 provides a benchmark for over 25 billion euros in ETF assets, highlighting its significance in global capital markets (Stoxx, n.d.). The substantial level of institutional exposure ensures high liquidity and transparency among its constituent stocks, providing

a foundation for analyzing investor behavior and herding. These characteristics are especially relevant when assessing market reactions to ESG-related signals.

Refinitiv's ESG score is a combination of three areas - environment (E), social responsibility (S), and governance (G) - and the total score is calculated on a total of 186 indicators based on companies' public reports. Following Gavrilakis and Floros's (2023) and Borokova and Wu's (2020) studies, we use the combined ESG score, the overall company score based on the reported information in the environmental, social, and corporate governance factors. The dataset includes annual observations on ESG scores and the daily stock returns calculated based on closing scores. The companies' stock prices and return indexes have been retrieved from the same database.

## **4.2 Methodology**

The primary aim of this thesis is to examine whether ESG performance leads to herding behavior by applying Chang et al.'s cross-sectional absolute deviation (CSAD) (2000). The methodology replicates the model Gavrilakis and Floros (2023) used by incorporating ESG scores into the CSAD framework. In addition, the CSAD model is further used to examine whether the onset of COVID-19 strengthened herding behavior. This thesis adopts a quantitative research design, using panel data analysis, to examine whether ESG scores or COVID-19 contribute to herding behavior in European equity markets and influence investors' tendency to follow collective market behavior.

The empirical approach utilizes Chang et al.'s Cross-Sectional Absolute Deviation (CSAD) (2000), which estimates variations in the cross-sectional dispersion of stock returns. The model detects possible herding over time by identifying the variation between individual stock returns and the market return. The CSAD model is a widely recognized behavioral finance approach that captures the return of dispersion. Decreased return of dispersion

while market returns are more extreme can be seen as an indicator of investors following the market consensus.

To evaluate whether the ESG score affects herding behavior, the CSAD model is extended by incorporating ESG score metrics. The methodology replicates the model by Gavrilakis and Floros (2023) by integrating ESG scores into the CSAD framework. This thesis aims to evaluate whether companies with higher ESG scores are more susceptible to investor herding by examining the interaction between squared market returns and ESG scores. This thesis also examines intensified herding behavior during heightened uncertainty (Christie & Huang, 1995; Rubbaniy et al., 2021) by introducing a COVID-19 dummy variable.

**Table 1**, Methodology used for the construction of variables.

Dependent variable	Measurement
$CSAD_t$	Cross-Sectional Absolute Deviation on day t
Independent variable	Measurement
$R_{i,t}$	Return on equity of the company day i on day t
$R_{m,t}$	Average market return on day t (used in CSAD)
$ESG_t$	Annual ESG overall score based on the environmental, social and corporate governance factors (Datastream)
Interaction term	Measurement
$ESG_t * R_{m,t}^2$	Interaction term between ESG score and squared market returns
Dummy variable	Measurement
$D^{COV}$	Taking value 1 for Covid-19 period, and 0 otherwise

CSAD by Chang et al., (2000) is the dependent variable in this study, which measures the average absolute deviation of individual stock returns from the market return on each trading day. The dependent variable captures the degree to which individual stock return deviates from market returns. This variable is widely used in behavioral finance to detect signs of herding, as well as in the study by Gavrilakis and Floros (2023), which is referenced in this thesis. The formula for capturing CSAD for day  $t$  is as follows:

$$CSAD_t = \frac{1}{N} \sum_{i=0}^n |R_{i,t} - R_{m,t}| \quad (3)$$

Where  $R_{i,t}$  is the return of the  $i$ th stock on day  $t$ ,  $R_{m,t}$  is the average market return (Euro STOXX 50) on day  $t$  and  $N$  is the number of stocks in the index. Daily stock returns are calculated using logarithmic returns.

The CSAD variable is calculated as the market return, which is the average of each stock's return on a particular trading day. Subsequently, the absolute deviation of each stock's return from the market return is determined. The mean of these absolute deviations is  $CSAD_t$ . This variable represents the primary outcome of interest in the regression analysis. Herding behavior will likely cause CSAD to fall during significant market moves rather than rise proportionately with the square of the market return.

Table 1 presents the independent variables to examine herding and the influence of ESG scores. These include absolute market return, the square of the market return, and an interaction term between ESG score and squared market return. The regression model to test the first hypothesis is as follows:

$$CSAD_t = \alpha + \gamma_1 |R_{m,t}| + \gamma_2 R_{m,t}^2 + \gamma_3 (ESG * R_{m,t}^2) + \varepsilon_t \quad (4)$$

Variables are the same as described above.

The coefficient  $\gamma_1$ , represents the absolute value of market returns and captures the relationship between market movements and return dispersion. It reflects the notion that return dispersion increases as the magnitude of market returns becomes larger. According to Change et al., (2000), when the coefficient  $\gamma_2$  is negative, this suggests the presence of herding. In the absence of herding  $\gamma_2$  is close to zero.

The interaction term  $ESG * R_{m,t}^2$  captures the influence of extreme market movements on return dispersion (CSAD), which varies depending on a company's ESG performance. By interacting with these two terms, we can examine whether a higher ESG score is linked to herding behavior. If the  $\gamma_3$  coefficient is negative and statistically significant, we can conclude that higher ESG performance is related to stronger herding behavior during market stress. This can be an indicator of investors' collective sensitivity to ESG ratings. On the contrary, if the coefficient is positive and significant, it suggests that a higher ESG score weakens the herding effect and does not systematically affect the extent of herding.

Christie and Huang (1995) find that herding is more prevalent and likely to occur during extreme market fluctuations. The second part of this thesis examines whether herd behavior was more prominent during the beginning of the COVID-19 pandemic. The selected timeframe is from January 2020, when the World Health Organization (WHO) declared the pandemic a public health emergency, until June 2020.

To test the second hypothesis about COVID-19, the asymmetric behavior of return dispersion is evaluated as follows:

$$CSAD_t = \alpha + \gamma_1 |R_{m,t}| + \gamma_2 R_{m,t}^2 + \gamma_3 D^{COV}(R_{m,t}^2) + \varepsilon_t \quad (5)$$

Th variables are the same as described above and  $D^{COV}$  is a dummy variable taking the value 1 for the COVID-19 period and zero otherwise. When there are no signs of herding  $\gamma_1$  will be positive and  $\gamma_2$ , equal zero. A significant and negative value for the coefficient  $\gamma_3$  will indicate herding during the COVID-19 outbreak.

### 4.3 Descriptive Statistics

Table 2 shows the descriptive statistics for the variables utilized in the analysis: the ESG score, daily market return, daily stock return, and the Cross-Sectional Absolute Deviation (CSAD). Presenting the mean, median, standard deviation, minimum, and maximum values for each variable based on a sample that includes all companies in the EURO STOXX 50 from January 1, 2020, to December 31, 2022.

**Table 2**, Descriptive Statistics.

Variable	Mean	Median	Std. Dev	Min	Max	Observations
ESG score	80,52	83,58	13,5174	24,9000	98,4100	782
Market Return	0,0002	0	0,0223	-0,2597	0,2413	782
Stock Return	0,0003	0	0,0223	-0,2287	0,2727	782
CSAD	0,011	0,010	0,005	0,000	0,048	782

The average ESG score is 80,52, indicating that the EURO STOXX 50 index companies exhibit relatively strong ESG performance. However, the 13,52 standard deviation shows substantial variation in ESG practices, with scores ranging from 24,9 to as high as 98,41.

The mean daily stock return is 0,03%, and the mean daily market return is 0,02 %. The median for both is zero, reflecting the behavior of broad equity indices with small daily fluctuations, which are symmetrically distributed around zero. This reflects the traditional finance theory that equity markets exhibit low net movements despite periods of higher volatility (Fama, 1970).

The mean for CSAD is 0,011 with a standard deviation of 0,005. This suggests a moderate level of cross-sectional return dispersion. The minimum value is 0, while the maximum reaches 0,048, indicating dispersed market movements. However, according

to Chang et al., (2000), CSAD alone does not measure herding, but the behavior should be examined as the relationship between stock market returns and CSAD.

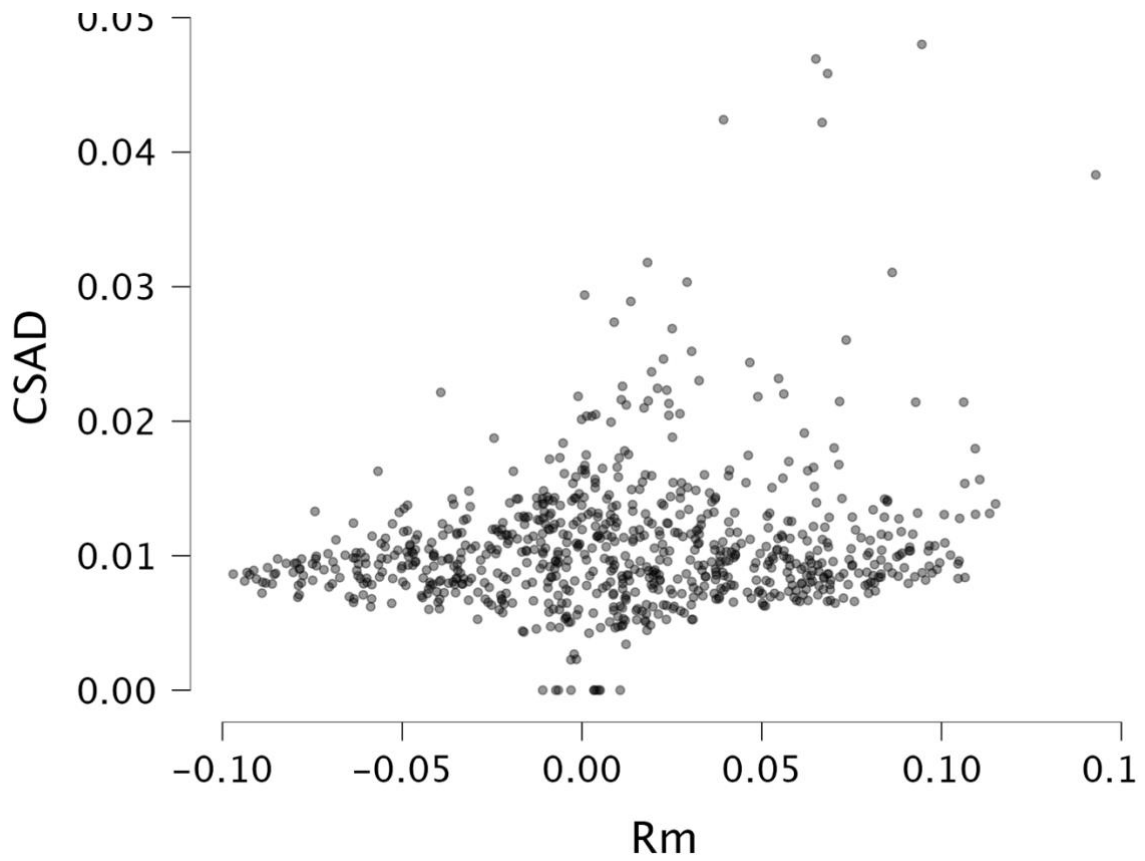
Figure 2 presents the market development during the sample period from January 2020 to December 2022. The index provides a baseline for examining market behavior and represents the performance of 50 large blue-chip companies in the Eurozone. The graph shows a sharp drop in early 2020 due to the COVID-19 pandemic, followed by a relatively strong recovery.



**Figure 2,** The daily returns of EURO STOXX 50

Figure 3 illustrates the highly scattered relationship between CSAD and market returns. CSAD increases as the absolute value of the market increases, which may suggest higher return dispersion, whether positive or negative. This preliminary observation implies that herding may not be present, as CSAD increases when the market becomes

more extreme. However, conclusions cannot be drawn from this figure alone. In the next chapter, herding behavior will be examined through empirical results.



**Figure 3**, The relationship between CSAD and market returns

## 5 Empirical Results

This chapter presents the findings of this thesis, which examines whether ESG performance or the COVID-19 outbreak affects herding behavior in the EURO STOXX 50 index between 2020 and 2022. The chapter is divided into three sub-chapters, following the structured approach: stating the hypothesis, analyzing the results, and assessing the hypothesis against the empirical results. Finally, limitations of this thesis are discussed.

### 5.1 The Impact of ESG Scores on Herding

The first hypothesis is tested using the extended CSAD model (Chang et al., 2000; Gavrilakis & Floros, 2023) (Equation 4) to examine if a higher ESG score affects the level of herding. This will be explored by testing the first hypothesis:

$H_1$ : Companies with higher ESG scores demonstrate reduced cross-sectional return dispersion, indicating that highly rated companies exhibit herding behavior among investors.

The regression results are presented below in Table 3, where the dependent variable is the daily CSAD, and the independent variables are the absolute market return, market square, and the interaction term between ESG score and market square.

**Table 3**, The regression results for herding analysis.

Variable	Coefficient	Standard Error	t-Statistic	P-value
Intercept	0,008	$2,419 \times 10^{-4}$	33,329	<0,001***
$ R_{m,t} $	0,364	0,032	11.476	<0,001***
$R_{m,t}^2$	-0,771	0,440	-1,753	0,080*
$ESG \times R_{m,t}^2$	1,923	0,568	3,387	<0,001***

$R^2 = 0,373$       Adjusted  $R^2 = 0,371$       F-Statistic = 154,224      p-value (F) = <0,001\*\*\*

Significance levels: \*\*\*  $p < 0,01$ , \*\*  $p < 0,05$ , \*  $p < 0,10$

The regression model's overall explanatory power,  $R^2$ , is 0,373. This indicates that 37,3 % of the variation in CSAD is explained by the independent variables. The moderate explanatory value suggests the model is well-suited, and it captures a substantial portion of the cross-sectional return dispersion in this data sample. The F-statistic is 154,22, and the corresponding p-value of less than 0,001. This indicates that the model is statistically significant, and the independent variables collectively explain a substantial portion of the variation in CSAD. The low p-value suggests that the likelihood of obtaining these results randomly is minimal. This emphasizes the strength of the model specification.

The absolute market term  $|R_{m,t}|$  coefficient is positive and statistically highly significant. This indicates that the return dispersion increases as the magnitude of market movements grows, regardless of the direction. A positive and significant  $\gamma_1$  coefficient is expected under normal market conditions and does not, by itself, provide evidence of herding behavior.

Additionally, the coefficient of the squared market return  $R_{m,t}^2$  is negative, which aligns with theoretical expectations by Chang et al., (2000). However, this is not statistically significant at the 5 % level. This negative relationship between squared market returns and CSAD suggests a possible tendency for herding, however it is not strong enough to confirm it in this sample. Consequently, the conclusion should be interpreted cautiously, although it is consistent with the literature.

The regression results for the coefficient of the interaction term  $ESG * R_{m,t}^2$  is positive and statistically significant at the 1 % level. This suggests that firms with higher ESG scores experience weaker herding than companies with lower ESG scores. A high ESG score appears to mitigate the convergence of individual stock returns towards market return. The findings indicate that higher ESG scores do not cause stronger herding in the observed dataset of EURO STOXX 50 companies.

The empirical results above provide opposing evidence for  $H_1$  and do not support this. The positive and significant coefficient on the interaction term suggests that higher ESG scores are associated with weaker herding behavior. Companies with stronger ESG performance show greater return dispersion, suggesting that investors act more independently rather than imitating other investors or market trends. The results imply that a higher ESG score is associated with transparency and reduces informational asymmetry, ultimately encouraging idiosyncratic trading behavior.

The results of this thesis are partly convergent with the findings of Gavrilakis and Floros (2023), who found signs of herding based on ESG scores in Greek and French stock markets. However, they found no signs of herding in Portugal, Italy, Spain, or Germany. In contrast to previous research that suggests that herding may intensify with higher ESG scores, the empirical result of this thesis indicates the opposite. Stronger ESG performance is linked to increased return dispersion. This could indicate that investors view high-ESG companies as more resilient, stable, and transparent, which may result in more independent trading choices.

Scharfstein and Stein (1990) demonstrate that herding strengthens when informational asymmetries are more substantial. When there is a lack of information, investors seem to imitate the actions of others, and in contrast with more information, herding tendencies are less prevalent. The results from this thesis may support this, as they did not seem to intensify with a higher ESG score, which can be associated with transparency

and disclosure quality. This reduces informational uncertainty and therefore may mitigate herding behavior.

The structure of the EURO STOXX 50 sample may also contribute to the results of this thesis. The stocks in this index consist of large, liquid, and well-monitored companies. Informational asymmetries may be relatively low, and herding may be due to macro-level signals rather than ESG factors. Future research could broaden the analysis to include smaller companies, where ESG may significantly influence investor decisions.

## **5.2 Herding behavior during COVID-19**

The second part of this thesis tests the findings of Christie and Huang (1995) regarding whether herding intensifies during periods of extreme market movement. The analysis utilizes an extended regression model by Gavrilakis and Floros (2023), in which a dummy variable was added. The objective is to investigate whether the onset of the pandemic affected the relationship between market returns and return dispersion (CSAD), and whether intensified herding behavior could be detected during the period from 1.1.2020 to 30.6.2020, when the pandemic initially spread. This will be investigated by testing the second hypothesis:

$H_2$ : Herding behavior is stronger during COVID-19

The regression analysis results are presented below in Table 4. The model's  $R^2$  is 37 %, explaining the variation in CSAD, and the overall F-statistic confirms the model is moderately statistically significant.

**Table 4**, The regression results for the COVID-19 interaction term.

Variable	Coefficient	Standard Error	t-Statistic	P-value
Intercept	0,008	$2,413 \times 10^{-4}$	32,811	<0,001***
$ R_{m,t} $	0,382	0,652	11,735	<0,001***
$R_{m,t}^2$	-2,024	0,774	-0,2616	0,009***
$COVID_t * R_{m,t}^2$	1,520	0,533	2,850	0,004***

$R^2 = 0,370$       Adjusted  $R^2 = 0,368$       F-Statistic = 152,469      p-value (F) = <0,001\*\*\*

Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$

Firstly, the coefficient on the absolute market return  $|R_{m,t}|$  is positive and highly statistically significant, supporting the findings that return dispersion increases with the size of market movements. This aligns with the findings by Chang et al., (2000) that reflect typical market response to volatility, rather than herding.

However, the coefficient on the squared market return  $R_{m,t}^2$  is negative as expected, and statistically significant. This provides evidence of herding where the stock return dispersion declines as the market returns become more extreme. This supports the framework by Chang et al., (2000).

The primary focus of this model is the interaction term  $COVID_t * R_{m,t}^2$ , which captures the changes in the relationship between market returns and return dispersions during the COVID-19 period. The coefficient on this interaction term is positive and statistically significant. This means that during the beginning of the pandemic, return dispersion increased in response to extreme market movements. The results suggest that the typical tendency of investors acting like other market agents weakened during the pandemic. Instead of exhibiting heightened herding, investors made more heterogeneous investment decisions, implying a decline in collective behavior.

The second regression model (Equation 5) tested hypothesis 2, suggesting that herding behavior intensified during COVID-19. However, the empirical results do not support this hypothesis. In the CSAD framework, return dispersion decreases when herding is detected. However, during the beginning of the pandemic from 1.1.2020 to 30.6.2020, the dispersion was higher, suggesting a more independent investor behavior during this period.

These findings contradict previous literature by Christie and Huang (1995) and Chang et al. (2000), who observe intensified herding during financial turbulence. However, Gavrilakis and Floros' findings are coherent to some extent. Their findings indicate that herding did not intensify during COVID-19 in Spain, France, and Germany, although signs of stronger herding were found in Italy, Portugal, and Greece. In addition, Alexakis et al., (2023) argue that investors did not take part in irrational herding but exhibited a "flight to fundamentals" during the COVID-19 market crisis. Additionally, Bogdan et al. (2022) found no signs of herding in the European stock market prior to or during COVID-19. Furthermore, Yarovaya et al., (2021) found no evidence of herding in cryptocurrencies during COVID-19.

However, this thesis's results contradict research results by Wu et al (2020) and Rubbaniy et al. (2021), who found significant signs of herding during the COVID-19 pandemic in the European, U.S, and Chinese stock markets. Espinosa-Méndez and Arias (2020;2021) also found signs of increased herding in European and Australian stock markets.

The dynamics of herd behavior may vary across geographic areas or depend on factors not captured in this analysis. Bogdan et al., (2022) argue that the impact of COVID-19 is different across markets and regions. They find that herding tends to be higher in the developed markets during market stress. EURO STOXX 50 is a blue-chip index in the Eurozone's well-established markets and might influence the smaller extent of herding behavior. Furthermore, there is no consensus in the literature regarding which specific phase of a crisis herding becomes most intense. Some studies find herding peaks during

the onset of a crisis, while contrarily others observe delayed effects as the financial uncertainty deepens (Economou et al., 2018; Chiang & Zheng, 2010).

### **5.3 Limitations**

When analyzing the empirical results, the limitations of this study must be considered. The limitations are related to the CSAD model, which is utilized as the methodology, and the sensitive timeframe of the data analyzed in this study. The data is relatively small, with only a three-year observation period, which may impact the results.

The CSAD model by Chang et al. (2000) is based on four statistical assumptions that may not correspond to financial market conditions in the real world. Firstly, the CSAD model assumes that the return distributions demonstrate homoscedasticity, indicating that the variability of stock returns remains consistent over time. In reality, stock markets may face varying volatility, especially during market uncertainty. Second, the CSAD model assumes that stock returns follow a normal distribution. However, returns are frequently irregular, especially during market shocks. Third, the model also assumes that each stock return's divergence from the mean is equally significant and independent of the others. Correlation between stocks, for example, in the same industry, may over- or understate the intensity of the herding. Finally, the CSAD assumes a linear relationship between stock and market returns, which may be non-linear, especially in unusual market conditions. All these assumptions may affect the performance of the model.

The timeframe used in this study consists of the time when the pandemic was present. The timeframes are not divided into shorter periods, e.g., the beginning of the pandemic, mid-pandemic, and downfall of the pandemic, which may capture the phenomenon of herding more efficiently in different market conditions. The overall period three years is also reasonably short, which may affect the capability to detect herding efficiently.

Spuroy (2013) states that herding research is multi-level, complex, and primarily performed indirectly or based on assumptions. When the data does not include private information before the trading decisions, it cannot be established with certainty that the investment decision was made by disregarding their information and mimicking others. Empirical testing is mainly based on quantifying the decision clustering; however, clustering may occur for various reasons.

## 6 Conclusion

This thesis examined how ESG scores influence herding behavior in the European stock market and whether herding changed during the COVID-19 crisis. More specifically, the thesis examined the effects of higher ESG scores and the onset of the pandemic on the timeframe from January 1, 2020, to December 31, 2022. Using the CSAD framework based on Chang et al., (2000) and further developed by Gavrilakis and Floros (2023), this thesis used the EURO STOXX 50 companies' data to test two hypotheses. (1) Higher ESG scores are associated with stronger herding, and (2) herding behavior intensified during the COVID-19 pandemic. Based on the empirical results, both hypotheses of this study are rejected.

In the first model, the interaction term between ESG score and squared market returns is positive and significant. This suggests that companies with higher ESG scores experience increased return dispersion during extreme market movements, suggesting more independent investor behavior instead of uniformly following market trends. Contrary to the hypothesis, the results indicate that higher ESG scores are associated with weaker herding.

This is consistent with literature that connects ESG transparency to reducing informational asymmetry (Kim & Park, 2023; Cheng et al., 2014). Stronger ESG performance that leads to higher ESG scores provides investors a clear understanding of the non-financial risks, consequently decreasing the uncertainty that can be seen as a driver for herd behavior. According to Bikhchandani et al. (1992), investors rely on the observable actions of others when they lack sufficient private information. Companies that disclose strong ESG performance provide investors with sufficient information to make independent, information-based decisions. This may attract more informed and autonomous investors, who are less prone to mimic market trends and more likely to perform a company-specific analysis. Therefore, reduced information asymmetry may serve as a mechanism to mitigate herding in companies with high ESG scores.

Regarding the second hypothesis, the empirical results revealed a weakened herding behavior during COVID-19 and thus rejected it. Herding was detected in the baseline model, but the interaction term between the COVID dummy and square market returns was positive. This indicates that the return dispersion increased during the initial six months of the pandemic, suggesting a more independent behavior rather than converging toward market consensus. Financial crises are typically associated with heightened reactions that amplify herding tendencies (Christie & Huang, 1995; Chang et al., 2000).

However, the results align with the evidence of Ferrueala and Mallor (2021), who also found no herding during the COVID-10 pandemic in European markets. The findings of this thesis resonate with the broader patterns identified in their study, where herding behavior is not uniform across time or crises. The nature of the crisis (endogenous vs exogenous) and market-specific factors contribute to different investor responses. The absence of observed herding may also be due to the index that the EURO STOXX 50 represents. Well-capitalized companies with a wide range of sectors, which analysts and institutional investors all widely follow. In this environment, investors have access to timely and firm-specific information, which is expected to reduce reliance on the actions of others. As a result, the lack of herding behavior may reflect a more informed and heterogeneous investor response, which is driven by private information rather than market-wide noise, in the context of a diversified blue-chip index like the EURO STOXX 50.

In conclusion, while the findings in this thesis are not definitive, they align with the previous literature that reports inconsistent evidence on herding behavior. However, these results contribute to the literature with a topical perspective on ESG scores and the COVID-19 period.

The findings presented in this thesis may contain potential implications in the light of practical decision-making. Understanding the presence and drives of herding is valuable

for financial institutions and analysts when perfecting their knowledge-based investment strategies. The results suggest that herding behavior occurs in the European blue-chip market, but factors like COVID-19 and ESG performance affect it. Based on the results, we may conclude that during turbulent periods, investors act more independently, reducing the effectiveness of the momentum strategy. Investors pursuing alpha through contrarian or arbitrage trading strategies may also profit less from crowd behavior. The results suggest that higher ESG scores are associated with weaker herding, highlighting their role as a signal of market stability and informational transparency. For investors focused on risk management and portfolio diversification, companies with strong ESG performance may provide an additional buffer against systematic risks. In addition to ethical and regulatory considerations, strong ESG performance can be seen as a strategic input for risk management.

From a corporate perspective, the results of this thesis imply that strong ESG performance may differentiate a company in the eyes of investors, which may encourage to evaluate investments more deeply rather than being carried away by the general market sentiment. This highlights the significance of transparent ESG practices as a communication tool to build investor trust and reduce reliance on collective behavior.

Given that both recent studies and the results of this thesis indicate that evidence of herding behavior remains inconclusive, future research should further explore this phenomenon. Suggestions for future research topics include the effect of ESG score on an extended timeframe and markets. A more extensive timeframe and country-specific data from stock markets contribute to the research line that suggests that herding differentiates at a market level. Expanding the geographical scope may provide new information on whether the impact of ESG herding is context-dependent.

Another suggestion for future research concerns herding during different phases of a financial crisis. The COVID-19 pandemic developed in various stages, including initial panic, stabilization, and recovery, and investor responses likely varied accordingly.

Previous research indicates that herding behavior has been observed at various stages of COVID-19, and in the future, a more in-depth comparison between these periods would be valuable. Although the ambiguity of herding behavior poses a challenge for researchers, it highlights the comprehensiveness and relevance of understanding modern financial markets.

## References

Al-Awadhi, A. M., Alsaifi, K., Al-Awadhi, A., & Alhammadi, S. (2020-09-01). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. *Journal of behavioral and experimental finance*, 27, 100326.

<https://doi.org/10.1016/j.jbef.2020.100326>

Albuquerque, R., Koskinen, Y., Yang, S., & Zhang, C. (2020-11-01). Resiliency of Environmental and Social Stocks: An Analysis of the Exogenous COVID-19 Market Crash. *The Review of Corporate Finance Studies*, 9(3), 593-621.

<https://doi.org/10.1093/rcfs/cfaa011>

Alexakis, C., Chantziaras, A., Economou, F., Eleftheriou, K., & Grose, C. (2023-07). Animal Behavior in Capital markets: Herding formation dynamics, trading volume, and the role of COVID-19 pandemic. *The North American journal of economics and finance*, 67, 101946.

<https://doi.org/10.1016/j.najef.2023.101946>

Anderson, L. R., & Holt, C. A. (1997-12-01). Information Cascades in the Laboratory. *The American economic review*, 87(5), 847-862.

Auer, B. R., & Schuhmacher, F. (2016-02-01). Do socially (ir)responsible investments pay? New evidence from international ESG data. *The Quarterly review of economics and finance*, 59, 51-62. <https://doi.org/10.1016/j.qref.2015.07.002>

Avery, C., & Zemsky, P. (1998). Multidimensional Uncertainty and Herd Behavior in Financial Markets. *The American economic review*, 88(4), 724-748.

<https://doi.org/10.2307/117003>

Banerjee, A. (1992). A Simple Model of Herd Behavior. *The Quarterly journal of economics*, 107(3), 797-817. <https://doi.org/10.2307/2118364>

Barberis, N., & Thaler, R. (2002). *A Survey of Behavioral Finance*

<https://doi.org/10.3386/w9222>

Benartzi, S., & Thaler, R. H. (1995-02-01). Myopic Loss Aversion and the Equity Premium Puzzle. *The Quarterly journal of economics*, 110(1), 73-92.

<https://doi.org/10.2307/2118511>

Benz, L., Jacob, A., Paulus, S., & Wilkens, M. (2020-02-01). Herds on green meadows: The decarbonization of institutional portfolios. *Journal of asset management*, 21(1), 13-31. <https://doi.org/10.1057/s41260-019-00147-z>

Berg, F., Kölbel, J. F., & Rigobon, R. (2022-11-01). Aggregate Confusion: The Divergence of ESG Ratings. *Review of Finance*, 26(6), 1315-1344.

<https://doi.org/10.1093/rof/rfac033>

Bikhchandani, S., Hirshleifer, D., & Welch, I. (1998). Learning from the Behavior of Others: Conformity, Fads, and Informational Cascades. *The Journal of economic perspectives*, 12(3), 151-170. <https://doi.org/10.1257/jep.12.3.151>

Bikhchandani, S., & Sharma, S. (2000). Herd behavior in financial markets. *IMF staff papers*, 47(3), 279–31–0.

Billio, M., Costola, M., Hristova, I., Latino, C., & Pelizzon, L. (2021-09). Inside the ESG ratings: (Dis)agreement and performance. *Corporate social-responsibility and environmental management*, 28(5), 1426-1445.

<https://doi.org/10.1002/csr.2177>

- Bogdan, S., Suštar, N., & Olgić Draženović, B. (2022-09-01). Herding behavior in developed, emerging, and frontier European stock markets during COVID-19 pandemic. *Journal of risk and financial management*, 15(9), 1-12.  
<https://doi.org/10.3390/jrfm15090400>
- BNP Paribas. (2023) ESG Global Survey. Taking Action; Institutional Investors Progress On the Path to Sustainability. Retrieved 2025-05-07 from  
[https://securities.cib.bnpparibas/app/uploads/sites/3/2023/12/esg-global-survey-consolidated-report.pdf?utm\\_source=chatgpt.com](https://securities.cib.bnpparibas/app/uploads/sites/3/2023/12/esg-global-survey-consolidated-report.pdf?utm_source=chatgpt.com)
- Borokova, S., & Wu, Y. (2020). ESG versus financial performance of large cap firms: The case of EU, U.S., Australia and Southeast Asia. *Refinitiv*.
- Bowen, H. R. (2014). *Social Responsibilities of the Businessman*: By Howard R. Bowen. Iowa City: University of Iowa Press.
- Capelle-Blancard, G., & Petit, A. (2019-06-01). Every Little Helps? ESG News and Stock Market Reaction. *Journal of business ethics*, 157(2), 543-565.  
<https://doi.org/10.1007/s10551-017-3667-3>
- Chang, E. C., Cheng, J. W., & Khorana, A. (2000-10-01). An examination of herd behavior in equity markets: An international perspective. *Journal of banking & finance*, 24(10), 1651-1679. [https://doi.org/10.1016/S0378-4266\(99\)00096-5](https://doi.org/10.1016/S0378-4266(99)00096-5)
- Chan, L. K. C., Jegadeesh, N., & Lakonishok, J. (1996-12). Momentum Strategies. *The Journal of finance* (New York), 51(5), 1681-1713.  
<https://doi.org/10.1111/j.1540-6261.1996.tb05222.x>
- Chatterji, A. K., Levine, D. I., & Toffel, M. W. (2009-03-01). How Well Do Social Ratings Actually Measure Corporate Social Responsibility? *Journal of economics &*

management strategy, 18(1), 125-169. <https://doi.org/10.1111/j.1530-9134.2009.00210.x>

Cheng, B., Ioannou, I., & Serafeim, G. (2014-01). Corporate social responsibility and access to finance. *Strategic management journal*, 35(1), 1-23.  
<https://doi.org/10.1002/smj.2131>

Chiang, T. C., & Zheng, D. (2010). An empirical analysis of herd behavior in global stock markets. *Journal of Banking & Finance*, 34(8), 1911–1921.  
<https://doi.org/10.1016/j.jbankfin.2009.12.014>

Christensen, D. M., Serafeim, G., & Sikochi, A. (2022-01-01). Why is Corporate Virtue in the Eye of The Beholder? The Case of ESG Ratings. *The Accounting review*, 97(1), 147-175. <https://doi.org/10.2308/TAR-2019-0506>

Christie, W. G., & Huang, R. D. (1995-07-01). Following the Pied Piper: Do Individual Returns Herd around the Market? *Financial analysts journal*, 51(4), 31-37.  
<https://doi.org/10.2469/faj.v51.n4.1918>

Clark, L.G., Feiner, A., & Viehs, M., (2014) From Stockholder to the Stakeholder: How Sustainability Can Drive Financial Outperformance. SSRN.  
<https://doi.org/10.2139/ssrn.2508281>

Devenow, A., & Welch, I. (1996). Rational herding in financial economics. *European economic review*, 40(3), 603–615. [https://doi.org/10.1016/0014-2921\(95\)00073-9](https://doi.org/10.1016/0014-2921(95)00073-9)

De Bondt, W. F. M., & Thaler, R. (1985-07). Does the Stock Market Overreact? *The Journal of finance (New York)*, 40(3), 793-805. <https://doi.org/10.1111/j.1540-6261.1985.tb05004.x>

D'Hondt, C., Merli, M., & Roger, T. (2022-05-01). What drives retail portfolio exposure to ESG factors? *Finance research letters*, 46, 102470.

<https://doi.org/10.1016/j.frl.2021.102470>

Eccles, R. G., Ioannou, I., & Serafeim, G. (2014-11). The Impact of Corporate Sustainability on Organizational Processes and Performance. *Management science*, 60(11), 2835-2857. <https://doi.org/10.1287/mnsc.2014.1984>

Economou, F., Hassapis, C., & Philippas, N. (2018-07-27). Investors' fear and herding in the stock market. *Applied economics*, 50(34-35), 3654-3663.

<https://doi.org/10.1080/00036846.2018.1436145>

Espinosa-Méndez, C., & Arias, J. (2021-01-01). COVID-19 effect on herding behaviour in European capital markets. *Finance research letters*, 38, 101787.

<https://doi.org/10.1016/j.frl.2020.101787>

Espinosa-Méndez, C., & Arias, J. (2021-12-15). Herding Behaviour in Australian stock market: Evidence on COVID-19 effect. *Applied economics letters*, 28(21), 1898-1901. <https://doi.org/10.1080/13504851.2020.1854659>

European Commission. (2011). A renewed EU strategy 2011–14 for corporate social responsibility (COM[2011] 681 final). European Commission. Retrieved 2025-05-06 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52011DC0681>

Fama, E. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance* 25:2, 383-417. <https://doi.org/10.2307/2325486>

- Fama, E. F. (1998-09-01). Market efficiency, long-term returns, and behavioral finance. *Journal of financial economics*, 49(3), 283-306. [https://doi.org/10.1016/S0304-405X\(98\)00026-9](https://doi.org/10.1016/S0304-405X(98)00026-9)
- Fama, E. F., & French, K. R. (1992-06). The Cross-Section of Expected Stock Returns. *The Journal of finance (New York)*, 47(2), 427-465.  
<https://doi.org/10.1111/j.1540-6261.1992.tb04398.x>
- Fama, E. F., & French, K. R. (1993-02-01). Common risk factors in the returns on stocks and bonds. *Journal of financial economics*, 33(1), 3-56.  
[https://doi.org/10.1016/0304-405X\(93\)90023-5](https://doi.org/10.1016/0304-405X(93)90023-5)
- Fama, E. F., & French, K. R. (2015-04-01). A five-factor asset pricing model. *Journal of financial economics*, 116(1), 1-22.  
<https://doi.org/10.1016/j.jfineco.2014.10.010>
- Ferreruela, S., & Mallor, T. (2021-11-01). Herding in the bad times: The 2008 and COVID-19 crises. *The North American journal of economics and finance*, 58, 101531. <https://doi.org/10.1016/j.najef.2021.101531>
- Friede, G., Busch, T., & Bassen, A. (2015-10-02). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. *Journal of sustainable finance & investment*, 5(4), 210-233.  
<https://doi.org/10.1080/20430795.2015.1118917>
- Friedman, M. (1970, September 13). The social responsibility of business is to increase its profits. *The New York Times Magazine*.  
<https://www.nytimes.com/1970/09/13/archives/a-friedman-doctrine-the-social-responsibility-of-business-is-to.html>

- Fulton, M., Kahn, B. M., & Sharples, C. (2012, June 12). Sustainable investing: Establishing long-term value and performance (Working paper).<http://dx.doi.org/10.2139/ssrn.2222740>
- Gavrilakis, N., & Floros, C. (2023-03-01). ESG performance, herding behavior and stock market returns: Evidence from Europe. *Operational research*, 23(1), 3.  
<https://doi.org/10.1007/s12351-023-00745-1>
- Giese, G., Lee, L., Melas, D., Nagy, Z., & Nishikawa, L. (2019-07-01). Foundations of ESG Investing: How ESG Affects Equity Valuation, Risk, and Performance. *Journal of portfolio management*, 45(5), 69-83.  
<https://doi.org/10.3905/jpm.2019.45.5.069>
- Graham, J. R. (1999). Herding among Investment Newsletters: Theory and Evidence. *The Journal of Finance (New York)*, 54(1), 237-268.  
<https://doi.org/10.1111/0022-1082.00103>
- Hirshleifer, D., & Hong Teoh, S. (2003-03). Herd Behaviour and Cascading in Capital Markets: A Review and Synthesis. *European financial management : the journal of the European Financial Management Association*, 9(1), 25-66.  
<https://doi.org/10.1111/1468-036X.00207>
- Hofstede, G. H. (2001). *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations* (2nd ed.). Sage.
- Hotten, R. (2015, December 10). Volkswagen: The scandal explained. BBC News.  
<https://www.bbc.com/news/business-34324772>
- Jegadeesh, N., & Titman, S. (1993). Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. *Journal of Finance*, 48(1), 65-91.

- Keynes, J. M. (1936). *The general theory of employment, interest, and money*.
- Khan, M., Serafeim, G., & Yoon, A. (2016-11-01). Corporate Sustainability: First Evidence on Materiality. *The Accounting review*, 91(6), 1697-1724.  
<https://doi.org/10.2308/accr-51383>
- Kim, J. W., & Park, C. K. (2023-06-03). Can ESG Performance Mitigate Information Asymmetry? Moderating Effect of Assurance Services. *Applied economics*, 55(26), 2993-3007. <https://doi.org/10.1080/00036846.2022.2107991>
- Kinder, P. (2005) *Socially responsible investing: An evolving concept in a changing world*. KLD Research & Analytics.
- Knüpfer, S., & Puttonen, V. (2004) *Moderni rahoitus*.
- Kocmanová, A., & Dočekalová, M. (2013). Construction Of The Economic indicators of Performance in relation to environmental, social and corporate governance (ESG) factors. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 60(4), 195-206.
- Kotsantonis, S., & Serafeim, G. (2014) *Four Things No One Will Tell You About ESG Data*. Wiley. <https://doi.org/10.1111/jacf.12346>
- Lakonishok, J., Shleifer, A., & Vishny, R. W. (1992). The impact of institutional trading on stock prices. *Journal of financial economics*, 32(1), 23-43.  
[https://doi.org/10.1016/0304-405X\(92\)90023-Q](https://doi.org/10.1016/0304-405X(92)90023-Q)
- Manik, J., Yardley, J. (2013) *Building collapse in Bangladesh Leaves Scores Dead*. Retrieved 2025-05-07 from <https://www.nytimes.com/2013/04/25/world/asia/bangladesh-building-collapse.html>

- Markowitz, H. (1952). Portfolio Selection. *The Journal of Finance* (New York), 7(1), 77-91. <https://doi.org/10.1111/j.1540-6261.1952.tb01525.x>
- Morgan Stanley. (2025). Sustainable Signals; Individual Investors. Retrieved 2025-05-07 from [https://www.morganstanley.com/content/dam/msdotcom/en/assets/pdfs/2025\\_Sustainable\\_Signals\\_Individual\\_Investors\\_2025\\_report.pdf](https://www.morganstanley.com/content/dam/msdotcom/en/assets/pdfs/2025_Sustainable_Signals_Individual_Investors_2025_report.pdf)
- National Oceanic and Atmospheric Administration. (n.d.). Deepwater Horizon oil spill settlements: Where the money went. NOAA. Retrieved 2025-05-07 from <https://www.noaa.gov/explainers/deepwater-horizon-oil-spill-settlements-where-money-went>
- Oh, C. H., Park, J., & Ghauri, P. N. (2013-11-01). Doing right, investing right: Socially responsible investing and shareholder activism in the financial sector. *Business horizons*, 56(6), 703-714. <https://doi.org/10.1016/j.bushor.2013.07.006>
- Przychodzen, J., Gómez-Bezares, F., Przychodzen, W., & Larreina, M. (2016-10-24). ESG Issues among Fund Managers—Factors and Motives. *Sustainability*, 8(10), 1078. <https://doi.org/10.3390/su8101078>
- Renneboog, L., Ter Horst, J., & Zhang, C. (2008-06-01). The price of ethics and stakeholder governance: The performance of socially responsible mutual funds. *Journal of corporate finance* (Amsterdam, Netherlands), 14(3), 302-322. <https://doi.org/10.1016/j.jcorpfin.2008.03.009>
- Rompotis, G. G. (2018-10-02). Herding Behavior among Exchange-Traded Funds. *The journal of behavioral finance*, 19(4), 483-497. <https://doi.org/10.1080/15427560.2018.1431886>

- Rubbaniy, G., Ali, S., Siriopoulos, C., & Samitas, A. (2021). Global financial crisis, COVID-19, lockdown, and herd behavior in the US ESG leader stocks. SSRN Electronic Journal. <https://doi.org/10.2139/ssrn.3868114>
- Scharfstein, D., & Stein, J. (1990). Herd Behavior and Investment. The American economic review, 80(3), 465-479. <https://doi.org/10.2307/2006678>
- Shiller, R. J. (2005). Irrational exuberance (2nd ed.). Princeton University Press.
- Shleifer, A. (2000). Inefficient markets: An introduction to behavioral finance. Oxford University Press.
- Shleifer, A., & Vishny, R. W. (1997-06). A Survey of Corporate Governance. The Journal of finance (New York), 52(2), 737-783. <https://doi.org/10.1111/j.1540-6261.1997.tb04820.x>
- Spyrou, S. (2013-01-01). Herding in financial markets: A review of the literature. Review of behavioral finance, 5(2), 175-194. <https://doi.org/10.1108/RBF-02-2013-0009>
- Statman, M. (2000-05-01). Socially Responsible Mutual Funds. Financial analysts journal, 56(3), 30-39. <https://doi.org/10.2469/faj.v56.n3.2358>
- STOXX. (n.d.). EURO STOXX 50 Index. Qontigo. <https://stox.com/index/sx5e/>
- United Nations Principles for Responsible Investment. (2021). ESG integration: How are social issues influencing investment decisions? UN PRI. <https://www.unpri.org/download?ac=6529>

Yarovaya, L., Matkovskyy, R., & Jalan, A. (2021-11-01). The effects of a “black swan” event (COVID-19) on herding behavior in cryptocurrency markets. *Journal of international financial markets, institutions & money*, 75, 101321.

<https://doi.org/10.1016/j.intfin.2021.101321>

Zhang, D., Hu, M., & Ji, Q. (2020-10-01). Financial markets under the global pandemic of COVID-19. *Finance research letters*, 36, 101528.

<https://doi.org/10.1016/j.frl.2020.101528>