

DOKUZ EYLÜL UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF BUSINESS ADMINISTRATION
BUSINESS ADMINISTRATION PROGRAM
MASTER'S THESIS

**EXPLORING THE IMPACT OF ENVIRONMENTAL,
SOCIAL, AND GOVERNANCE (ESG) FACTORS ON
INVESTOR BEHAVIOR AND UNRAVELING HERDING
EFFECTS IN U.S STOCK MARKET**

Sahar SHAREFI ABADI

Supervisor
Asst. Prof. Habil GÖKMEN

2025

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APPROVAL PAGE

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DECLARATION

I hereby declare that this master thesis titled “Exploring the Impact of Environmental, Social, and Governance (ESG) Factors on Investor Behavior: Unraveling Herding Effects in U.S. Financial Markets” has been written by myself in accordance with the academic rules and ethical conduct. I also declare that all materials in this thesis benefited from the mentioned resources in the reference list. I verify all these with my honor.

28.6.2025

Sahar SHAREFI ABADI

ABSTRACT

Master's Thesis

Exploring the Impact of Environmental, Social, and Governance (ESG) Factors on Investor Behavior and Unraveling Herding Effects in U.S. Stock Market

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This study explores the intricate relationship between Environmental, Social, and Governance (ESG) performance and herding behavior in the U.S. stock market between 2018 and 2024, with a particular focus on the pre- and post-COVID-19 periods. Grounded in behavioral finance theory and employing the Cross-Sectional Absolute Deviation (CSAD) model, this research investigates how sustainability metrics and firm-specific financial indicators such as market capitalization, price-to-book ratio, and Sharpe ratio interact to influence investor behavior, especially during periods of market stress.

The empirical analysis is based on a panel dataset of 100 publicly traded U.S. firms across diverse sectors, using monthly financial and ESG data from Yahoo Finance and Refinitiv. Regression models were developed to examine the extent of herding behavior and how it is moderated by ESG performance and firm characteristics. The results provide robust evidence of herding behavior in all periods, with a significant increase during the COVID-19 pandemic, confirming the psychological biases investors exhibit in crisis contexts.

Importantly, the study finds that firms with higher ESG scores experience significantly lower levels of herding behavior, especially in the post-pandemic period, indicating that sustainability performance can act as a stabilizing factor in volatile markets. In contrast, high Sharpe ratios and firm size are associated with increased investor attention, influencing collective behavior. The findings bridge two important domains—behavioral finance and sustainable investing—

by showing that ESG considerations are not only ethical or regulatory tools but also have tangible effects on market dynamics and investor psychology.

This study contributes to the academic literature by providing comprehensive evidence of ESG's moderating role in herding behavior, particularly under systemic uncertainty. It also provides practical implications for investors, corporate strategists, and policymakers seeking to promote more resilient and informed capital markets.

Keywords: Herding Behavior, ESG Scores, Behavioral Finance, COVID-19, Financial Markets, Sustainable Investing, Panel Data Analysis, Market Volatility, Sharpe Ratio, Firm Size.



ÖZET

Yüksek Lisan Tezi

Çevresel, Sosyal ve Yönetişim (ESG) Faktörlerinin Yatırımcı Davranışları Üzerindeki Etkisi ve ABD Hisse Senedi Piyasasında Sürü Davranışlarının Analizi

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İngilizce İşletme Anabilim Dalı

İngilizce İşletme Yönetimi Programı

Bu çalışma, 2018–2024 yılları arasında ABD hisse senedi piyasasında Çevresel, Sosyal ve Yönetişim (ESG) performansı ile sürü davranışı arasındaki karmaşık ilişkiyi incelemektedir. Özellikle COVID-19 pandemisi öncesi ve sonrası dönemlere odaklanılarak yatırımcı davranışlarının sürdürülebilirlik faktörleri karşısındaki tepkileri analiz edilmiştir. Davranışsal finans teorisine dayanan çalışmada, sürü davranışını ölçmek için Chang ve arkadaşları (2000) tarafından geliştirilen Çapraz-Sapma Mutlak Değer (CSAD) modeli kullanılmıştır.

Çalışma, teknoloji, sağlık, enerji, tüketim ve finans sektörlerinden seçilen 100 ABD firmasına ait aylık finansal ve ESG verilerini kullanarak panel veri regresyonları ile gerçekleştirilmiştir. Finansal veriler Yahoo Finance'tan, ESG verileri ise Refinitiv ESG veri tabanından elde edilmiştir. Regresyon analizleri, sürü davranışının varlığını ve ESG performansının bu davranış üzerindeki etkisini değerlendirmek amacıyla yapılandırılmıştır.

Elde edilen bulgular, incelenen tüm dönemlerde yatırımcıların sürü davranışı gösterdiğini ortaya koymakta, özellikle COVID-19 döneminde bu davranışın daha da güçlendiğini göstermektedir. Bu durum, kriz zamanlarında yatırımcıların psikolojik önyargılarla hareket ettiklerini desteklemektedir. Ayrıca, yüksek ESG puanına sahip firmaların sürü davranışına daha az maruz kaldığı tespit edilmiştir. Bu etki, pandemi sonrası dönemde istatistiksel olarak

daha belirgin hale gelmiştir. Bu da ESG uygulamalarının sadece etik veya itibar aracı olmadığını, aynı zamanda piyasa dalgalanmalarına karşı dengeleyici bir unsur olarak da işlev gördüğünü göstermektedir.

Buna karşın, yüksek Sharpe oranları ve büyük ölçekli firmalar yatırımcıların dikkatini daha fazla çekmiş ve sürü davranışını artırmıştır. Çalışma, davranışsal finans ile sürdürülebilir yatırım literatürlerini bir araya getirerek ESG faktörlerinin piyasa davranışları üzerindeki etkisini somut biçimde ortaya koymaktadır.

Bu araştırma, sistemsel belirsizlik altında ESG faktörlerinin sürü davranışını nasıl şekillendirdiğini göstererek literatüre özgün bir katkı sunmaktadır. Ayrıca yatırımcılar, firma yöneticileri ve politika yapıcılar için daha istikrarlı ve bilinçli bir sermaye piyasası oluşturulmasına yönelik önemli pratik çıkarımlar da sunmaktadır.

Anahtar Kelimeler: Sürü Davranışı, ESG Skorları, Davranışsal Finans, COVID-19, Finansal Piyasalar, Sürdürülebilir Yatırım, Panel Veri Analizi, Piyasa Oynaklığı, Sharpe Oranı, Firma Büyüklüğü.

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INTRODUCTION

Herd Behavior and Financial Markets;

Herding behavior has been extensively documented as a deviation from the Efficient Market Hypothesis (Fama, 1970) and suggests that investors often follow the crowd rather than process information independently. Pioneering work by Bikhchandani, Hirshleifer, and Welch (1992) demonstrated informational cascades in which individuals, despite possessing private information, choose to imitate the actions of their predecessors, leading to correlated behaviors that may not reflect the underlying ones.

Chang et al. (2000) proposed the Cross-Sectional Absolute Deviation (CSAD) method as a practical approach to detect herding behavior. Their model assumes a non-linear relationship between the dispersion of individual stock returns and the overall market return: under herding conditions, as market movements become more extreme, the dispersion of returns decreases rather than increases, contrary to standard financial theory.

Market crises, such as the 2008 Global Financial Crisis and the recent COVID-19 pandemic, provide fertile ground for herding behavior. During such periods, investors often abandon independent assessments and cluster toward perceived “safe assets” or collective investment themes. Whether ESG-focused investing plays a stabilizing or destabilizing role in such scenarios is an open empirical question.

ESG Investing and Investor Behavior;

The increasing importance of ESG considerations in investment strategies has reshaped traditional concepts of risk and return. ESG investing is often viewed as a way to reduce long-term risks, increase corporate accountability, and align investment portfolios with societal values. However, the integration of ESG factors also raises behavioral questions: Is the increasing popularity of ESG investing causing investors to behave differently? In particular, is ESG awareness encouraging independent, informed decision-making, or is it creating new herd dynamics driven by societal trends and institutional pressures?

Some scholars argue that ESG integration reduces information asymmetry and thus discourages potentially irrational collective behavior (Amel-Zadeh and Serafeim, 2018). Conversely, the rapid increase in ESG fund flows and the proliferation of ESG-themed investment products may encourage trend-following behavior, especially among institutional investors who are trying to align with evolving regulatory and societal expectations.

Additionally, ESG investing is not a monolithic concept. Different investors prioritize environmental, social or governance factors differently, and ESG scores often combine heterogeneous criteria into a single rating. This diversity complicates the assessment of how ESG impacts investor behavior and herding tendencies.

COVID-19 and Changes in Investment Dynamics;

The COVID-19 pandemic has significantly disrupted global financial markets, creating unprecedented levels of volatility, uncertainty, and behavioral shifts among investors. Initial market reactions reflected widespread panic and liquidity hoarding, followed by a rapid recovery supported by fiscal stimulus, monetary easing, and sectoral rotations.

During this period, ESG investing appeared to gain more momentum. Several studies reported that ESG funds showed relative resilience compared to traditional funds, likely due to investors' heightened sensitivity to corporate social responsibility during the crisis (Refinitiv, 2020). This observation raises intriguing questions about the relationship between ESG performance and investor herding during periods of systemic stress.

Have investors flocked to ESG assets as “safe havens” during the pandemic? Or has the ESG trend itself become a source of speculative herding? These questions highlight the need for empirical research into the ESG-herding nexus in crisis contexts.

Gaps in Existing Literature;

Although herding behavior has been studied extensively within the behavioral finance framework (Bikhchandani and Sharma, 2001; Devenow and Welch, 1996) and ESG investing has garnered significant academic attention (Friede, Busch, and Bassen, 2015), limited research has explicitly linked ESG integration to herding behavior.

Most previous studies have focused on the financial performance impacts of ESG factors or herding dynamics in traditional investment contexts without considering ESG-specific effects. The potential for ESG to mitigate or increase herding is largely speculative and has little empirical validation.

Moreover, existing research often treats ESG scores as homogeneous constructs without examining the differential impacts of environmental, social, and governance dimensions. Similarly, the role of macroeconomic shocks such as the COVID-19 pandemic in moderating ESG herding dynamics has been largely overlooked.

This study addresses these gaps by systematically analyzing the relationship between ESG scores and herding behavior across a large sample of U.S. firms, focusing specifically on changes before and after the onset of the COVID-19 crisis.

Research Objectives and Questions;

Building on the identified gaps, this study sets out the following primary research objectives:

- To examine whether ESG scores affect herding behavior in the U.S. stock market.

- To assess whether the relationship between ESG and herding behavior changes during periods of market stress, particularly the COVID-19 pandemic.

- Investigate the role of firm-specific characteristics (e.g. market capitalization, price-to-book value ratio, Sharpe ratio) in moderating herding tendencies. Contribute to the theoretical integration of ESG investing and behavioral finance frameworks by empirically testing ESG-related herding hypotheses.

Based on these objectives, the key research questions driving this thesis are:

1. Does ESG performance significantly influence herding behavior among U.S. investors?
2. Is herding behavior more pronounced for high-ESG firms during periods of market volatility?
3. How do traditional financial metrics interact with ESG scores in influencing herding behavior?
4. Has the COVID-19 pandemic reinforced or altered herding tendencies regarding ESG?

Brief Overview of the Methodology;

To address the research questions, this study employs a quantitative approach using panel data analysis. The primary empirical framework is based on the Cross-

Sectional Absolute Deviation (CSAD) model developed by Chang et al. (2000), which captures the nonlinear relationships between market returns and stock return distributions as an indicator of herding behavior.

Specifically, the study estimates CSAD regressions when:

- Absolute market returns ($|R_{m,t}|$) and squared market returns ($R_{m,t}^2$) are the main explanatory variables,

- Interaction terms between ESG scores and market returns are introduced to test the moderating effects of ESG performance,

- A COVID-19 dummy variable (D_{cov}) was included to capture structural changes in herd behavior during the pandemic period.

The dataset includes monthly observations from January 2018 to April 2024 for a sample of 100 publicly traded U.S. companies selected from a variety of sectors to increase generalizability. ESG ratings are from Refinitiv, a leading provider of standardized ESG data.

To reveal temporal changes in herd dynamics and ESG effects, regression models are estimated separately for the pre-pandemic and post-pandemic periods.

Structure of the Thesis;

The remainder of this thesis is organized as follows:

- Chapter 2: Literature Review

This section reviews relevant literature on herding behavior, behavioral finance, ESG investing and the impact of market crises on investor behavior.

- Chapter 3: Methodology

This section explains the research design, sample selection, variable creation and econometric models used in the study.

- Chapter 4: Empirical Results

This section presents the regression results, discusses the key findings, and interprets the implications in the context of existing theories and studies.

- Chapter 5: Conclusion

This section summarizes key findings, discusses limitations, presents policy implications, and suggests directions for future research.

CHAPTER ONE

LITERATURE REVIEW

1.1. INTRODUCTION TO BEHAVIORAL FINANCE AND HERD BEHAVIOR

Behavioral finance has emerged as a critical field challenging assumptions of classical finance theories, such as the Efficient Market Hypothesis (Fama, 1970), by emphasizing psychological influences on investor decision-making. The pioneering work of Kahneman and Tversky (1979) introduced Prospect Theory, which suggests that individuals evaluate potential losses and gains differently, leading to systematic biases and deviations from rational behavior. These insights have provided the basis for understanding market anomalies, including herd behavior.

Herding is defined as the tendency of investors to imitate the actions of others rather than rely on their private information and has important implications for financial market efficiency and stability. Bikhchandani and Sharma (2001) distinguish between rational herding, which results from information cascades, and irrational herding, which results from psychological biases such as fear, conformity, or reputational concerns. Devenow and Welch (1996) argue that reputational herding occurs when fund managers adapt their strategies largely without regard to their private information in order to protect their careers.

Chang et al. (2000) provided an innovative empirical approach to detect herding by proposing the Cross-Sectional Absolute Deviation (CSAD) model. Their model assumes a non-linear relationship between the dispersion of individual stock returns and the overall market return. In the absence of herding, the dispersion increases proportionally to the market return. However, under herding conditions, the dispersion decreases as extreme market movements cause investors to cluster their trading behavior.

Market crises such as the 1997 Asian Financial Crisis, the 2008 Global Financial Crisis, and the 2020 COVID-19 pandemic have been fertile ground for the herding phenomenon. During periods of heightened uncertainty, investors tend to abandon independent analysis and follow collective trends, seek psychological comfort, and minimize perceived risks.

Recent studies have extended herding analysis to various asset classes and geographic regions, confirming that herding is a widespread and context-dependent behavior. For example, Chiang and Zheng (2010) documented herding in Asian and US markets and highlighted that herding behavior varies in bull and bear markets. Similarly, Tan et al. (2008) found evidence of herding during market declines in Chinese stock markets.

Understanding herding dynamics is vital to policymakers, investors, and researchers because excessive herding can increase market volatility, fuel asset bubbles, and exacerbate financial crises. As ESG investing gains momentum, it is increasingly important to investigate whether ESG factors serve as herding stabilizing forces or new drivers in today's financial markets.

1.2. ESG INVESTING AND ITS IMPACT ON FINANCIAL MARKETS

1.2.1. Definition and Historical Growth of ESG Investing

Environmental, Social and Governance (ESG) investing refers to the integration of non-financial factors into investment analysis and decision-making processes. It emphasizes corporate behaviors related to environmental sustainability, social responsibility, and governance structures. The roots of ESG investing can be traced back to the socially responsible investment (SRI) movements of the 1960s and 1970s, and the concept gained mainstream momentum in the early 21st century (Amel-Zadeh and Serafeim, 2018). The Global Sustainable Investment Alliance (GSIA, 2020) reported that global sustainable investment assets reached \$35.3 trillion in 2020, reflecting increasing investor appetite.

1.2.2. Drivers of ESG Investment and the Role of Institutional Investors

The rise in ESG investing is driven by several factors, including increased regulatory requirements, increased public awareness of sustainability issues, and evidence linking ESG performance to financial results (Friede, Busch and Bassen, 2015). Institutional investors, such as pension funds and sovereign wealth funds, have

played a significant role by integrating ESG criteria into their investment mandates. These large institutions are influencing market trends, potentially reinforcing herding behavior toward ESG-compliant firms.

1.2.3. ESG Investment Strategies Shape Both Market Risk Perceptions and Investor Decision-Making Processes

The analysis shows that ESG investments have significant impacts on financial performance and market exposure. Khan, Serafeim, and Yoon (2016) found that ESG performance excellence in firms reduces their systematic risk and leads to better profitability outcomes. Research conducted by Eccles, Ioannou, and Serafeim (2014) showed that organizations with high sustainability performance outperform their peers over long-term periods. The research shows that ESG metrics affect how investors view company stability, thereby changing collective investment practices.

1.2.4. ESG Investing and Herd Behavior

The rapid adoption of ESG investment strategies is raising concerns among investors about the emergence of new herding patterns. ESG compliance has emerged as a leading investment story, causing investors to follow an investment momentum in ESG-compliant firms without considering fundamental value. The pandemic period led Refinitiv (2020) to record a large influx of funds into ESG investments as investors collectively shifted their market preferences.

The rise of ESG investing has two opposing effects: it reduces information asymmetry, and it can create market bubbles if herd mentality overrides fundamental investment decisions, according to Amel-Zadeh and Serafeim (2018).

1.2.5. Challenges and Criticisms of ESG Data

The growth of ESG investing faces multiple barriers that hinder its success. According to Berg, Koelbel, and Rigobon (2022), multiple rating agencies, including MSCI, Refinitiv, and Sustainalytics, use different assessment methodologies that

create significant differences in ESG score ratings. The lack of standardized ESG assessment makes it difficult for investors to properly assess ESG risks.

According to Amel-Zadeh and Serafeim (2018), companies that greenwash by providing superficial ESG disclosure reports without making real changes to their operations pose reputational risks. Investors' over-reliance on ESG scores creates a situation where they may engage in herding behavior based on false or manipulated information. The rise of ESG investing has brought new market influences to the financial sector. While integrating ESG into investments may seem promising for economic sustainability, it creates a risk of market herding as investors tend to use ESG labels instead of making comprehensive assessments. The modern investment environment requires investors to understand how ESG functions as both a market stabilizer and a potential destabilizer in order to understand current market behavior.

1.3. HERD BEHAVIOR DURING FINANCIAL CRISES

1.3.1 Definition of Financial Crises

Financial markets experience major disruptions that lead to declining asset values, along with reduced market liquidity and investor panic (Borio & Lowe, 2002; Brunnermeier & Pedersen, 2009). Financial crises develop through economic imbalances, accompanied by excessive risk taking and asset price bubbles, while financial institutions fail in their regulatory functions (Minsky, 1986; Kindleberger & Aliber, 2011).

1.3.2. Evidence of Herd Behavior in Past Crises

Many scientific studies have demonstrated that herding behavior has occurred during previous financial crises. Bikhchandani and Sharma (2001) show that increased uncertainty leads investors to reject private information and adopt market trends in their information cascade. Chiang and Zheng (2010) have shown significant market herding behavior during periods of extreme market volatility in Asian and US markets. Tan et al. (2008) find evidence of increased herding behavior in Chinese stock markets

during market declines. Two major financial crises demonstrate how herding behavior intensified during the 1997 Asian Financial Crisis and the 2008 Global Financial Crisis (Reinhart and Rogoff, 2009; Gorton, 2009; Financial Crisis Inquiry Commission, 2011). During such periods, investors shifted to risk-free assets while at the same time withdrawing funds from risky markets, thus intensifying market volatility (Taylor, 2009; Rajan, 2010; Shiller, 2015).

1.3.3 Herd Behavior During the COVID-19 Pandemic

Global financial markets experienced exceptional uncertainty during the COVID-19 pandemic, which caused immediate changes in investor actions. Goodell (2020) explains how the pandemic created new system-wide hazards that changed traditional risk management calculations. Espinosa-Méndez and Arias (2021) found large herding actions among global equity markets at the beginning of the pandemic as investors rapidly shifted to the healthcare and technology sectors.

Refinitiv (2020) reports that ESG funds have experienced record inflows during the pandemic, suggesting that sustainability considerations are at the core of investment decisions under crisis conditions. This collective movement toward ESG assets raises questions about whether investors are making rational reallocations based on fundamentals or joining the trend-driven herd.

1.3.4. ESG Investing and Joining the Herd During a Crisis

The relationship between ESG investing and herding behavior becomes particularly evident during financial crises. On the one hand, ESG factors can provide additional information content that can help reduce information asymmetry and encourage independent decision-making (Amel-Zadeh and Serafeim, 2018). On the other hand, the increasing popularity of ESG themes can lead to crowding-out effects, especially when institutional investors simultaneously allocate large amounts of inflows to ESG-compliant portfolios (Brunnermeier, Rother and Schnabel, 2019).

During COVID-19, ESG-themed assets not only outperformed traditional benchmarks but also exhibited lower volatility (Refinitiv, 2020). However, the increase

in ESG fund flows raises concerns about bubble formation if investment decisions are based on trends rather than rigorous fundamental analysis. Financial crises reinforce herding behavior among investors as increased uncertainty drives collective behavior. ESG investing as a potential stabilizing force has been increasingly embraced by investors during crises, but this mainstream adoption during crises can introduce new sources of systemic risk through herding dynamics. The precise nature of these relationships is crucial for interpreting market outcomes during times of stress and designing resilient investment strategies (Cox, 2018; Brunnermeier et al., 2019)

1.4. REVIEW OF SIMILAR STUDIES

1.4.1. Review of Herd Studies

Herding behavior in financial markets has been studied extensively in the finance literature. Bikhchandani, Hirshleifer, and Welch (1992) presented the first theoretical models of informational cascades, where individuals follow the observed actions of their predecessors despite having private information, thus leading to herd-like behavior in markets. Bikhchandani and Sharma (2001) built on this foundation by providing a comprehensive review of herding behavior in financial markets, discussing the role of psychological, informational, and reputational factors. Chang, Cheng, and Khorana (2000) proposed an empirical model to detect herding behavior based on the Cross-Sectional Absolute Deviation of Returns (CSAD). Their study found significant evidence of herding behavior in emerging markets compared to developed markets, especially during periods of extreme market movements. The methodology has since become the standard approach in empirical herding research. Chiang and Zheng (2010) extended this analysis by examining herding in 18 countries. Their results showed that herding is more pronounced during market declines and in Asian markets compared to Western markets, suggesting that cultural and structural differences may affect the intensity of herding. Tan, Chiang, Mason, and Nelling (2008) specifically investigated herding behavior in Chinese stock markets. Their observations supported the hypothesis that investors increase herding behavior as a way of seeking the safety of the crowd when markets are declining. Hwang and Salmon (2004) presented a new

measure of herding based on the cross-sectional distribution of expected returns instead of realized returns. Their model provided additional insights into herding behavior during market bubbles and crashes . Garg and Gupta (2014) examined herding behavior in Indian stock markets and found that herding behavior is more pronounced during periods of market stress, particularly among individual investors compared to institutional investors. Caparrelli , D'Arcangelis , and Cassuto (2004) analyzed herding behavior in the Italian Stock Exchange and concluded that herding behavior is sector-specific, being more pronounced in sectors with high information uncertainty. Yao , Ma, and He (2014) examined the impact of market liquidity on herding behavior in China and found that markets with lower liquidity are more prone to herding behavior. This suggests that liquidity constraints reinforce collective behavior patterns . Christie and Huang (1995) provided early empirical evidence of herding behavior during market stress, especially during periods of large price movements. Their work remains a fundamental reference for detecting herding behavior using cross-sectional standard deviation (CSSD) measures . Collectively, these studies show that herding behavior is shaped by market structure, cultural elements, liquidity conditions, and investor psychological factors. Detection methods such as CSAD and CSSD remain vital tools in empirical finance to understand collective investor behavior. These findings provide a fundamental background for assessing how ESG investment trends may affect herding behavior, which will be analyzed in more detail in the following sections.

1.4.2 Review of ESG Studies

The relationship between Environmental, Social and Governance (ESG) practices and financial performance has been extensively researched. Amel-Zadeh and Serafeim (2018) critically assessed the motivations and outcomes of ESG investments, arguing that although ESG disclosures have improved, a significant gap remains between corporate reporting and actual sustainability practices. They emphasized that ESG investment is often driven by risk management and value creation rather than pure ethical concerns.

Friede, Busch, and Bassen (2015) conducted one of the most comprehensive meta-analyses, combining more than 2,200 studies on ESG and corporate financial performance. Their findings revealed that approximately 90% of studies reported a non-negative relationship, with the vast majority finding a positive link between ESG factors and financial outcomes. This consensus supports the case for integrating ESG into mainstream investment strategies.

Khan, Serafeim, and Yoon (2016) investigated the materiality of ESG issues by distinguishing between financially significant and non-significant ESG factors. Their research showed that firms that excelled across financially material ESG dimensions achieved superior risk-adjusted stock returns. This study highlighted the importance of distinguishing between financially material and non-material ESG issues.

Eccles, Ioannou, and Serafeim (2014) compared high sustainability firms that had long-standing ESG principles adherence with traditional firms. They found that high sustainability firms significantly outperformed their peers in stock market and accounting performance over an 18-year period, suggesting that incorporating ESG practices into corporate strategy provides long-term financial benefits.

Berg, Koelbel, and Rigobon (2022) highlighted a critical challenge in ESG investing: the lack of consistency across ESG rating providers. They showed that correlations between different ESG ratings are surprisingly low, creating uncertainty and potential mispricing in markets. This inconsistency complicates the task of identifying truly sustainable companies and could inadvertently encourage herding behavior if investors rely on popular ESG scores without due diligence.

Refinitiv (2020) and MSCI ESG Research reports have highlighted the resilience of ESG investments during the COVID-19 pandemic. Both sources observed that ESG-focused funds outperformed traditional funds during the crisis, experiencing smaller declines and faster recoveries. These findings suggest that ESG factors can serve as indicators of corporate resilience during systemic shocks.

However, despite the growing body of supporting evidence, ESG investing faces criticism. Critics argue that greenwashing, where companies exaggerate their sustainability claims, remains common. Furthermore, the lack of standardized ESG metrics and regulatory oversight leads to information asymmetries that can distort investment decisions (Amel-Zadeh & Serafeim, 2018).

Overall, the ESG investment literature suggests that when investors focus on important ESG issues, there is a generally positive relationship between ESG performance and financial outcomes. However, challenges remain regarding data reliability, greenwashing, and standardization. These insights are crucial to understanding the complex dynamics between ESG assessments and potential herding behavior in financial markets. The link between Environmental, Social, and Governance (ESG) practices and financial performance has been extensively researched. Amel-Zadeh and Serafeim (2018) examined the motivations and impacts of ESG investing, concluding that ESG disclosures have improved but that there are significant differences between reporting practices and actual sustainability practice. The authors state that the primary drivers of ESG investing are risk management and value creation rather than moral considerations.

Friede, Busch, and Bassen (2015) conducted one of the most comprehensive research reviews on ESG and corporate financial performance. The authors found that approximately 90% of the studies reviewed showed a non-negative relationship, with the majority showing positive financial links between ESG factors and performance indicators. The current research consensus has helped support the inclusion of ESG in standard investment approaches.

Khan, Serafeim, and Yoon (2016) examined the importance of ESG issues by distinguishing financial materiality from non-financial ESG factors. Their study showed that firms that perform well on ESG dimensions that create financial value achieve superior risk-adjusted stock performance. This study highlights the need to distinguish between ESG issues that impact financials and those that do not.

Eccles, Ioannou, and Serafeim (2014) analyzed the performance of companies that made a consistent commitment to ESG principles compared to traditional business organizations. The researchers found that organizations committed to sustainability outperformed their standard counterparts in both stock market and accounting performance over an 18-year period.

Berg, Koelbel, and Rigobon (2022) found that a major obstacle to ESG investing is the varying standards of ESG rating providers. They found that ESG ratings from different providers exhibit unexpectedly low levels of correlation, leading to market uncertainty and pricing inaccuracies. Conflicting information hinders

investors from identifying true sustainability in companies and can lead to investor herding as they rely on widely used ESG scores without proper due diligence.

The COVID-19 pandemic has not affected the stability of ESG investments, according to reports from Refinitiv (2020) and MSCI ESG Research. Both sources document that ESG-focused funds outperformed traditional funds during the crisis, showing fewer losses and faster market recoveries. The research suggests that ESG factors can serve as indicators that help identify resilient companies during major economic disruptions.

The growing body of evidence supporting ESG investing continues to face many challenges. Critics say companies continue to misrepresent their sustainability efforts through greenwashing. The lack of uniform ESG metrics and weak regulatory oversight lead to information asymmetries that can mislead investment choices (Amel-Zadeh & Serafeim, 2018).

Research on ESG investing shows that when investors focus on key ESG factors, better financial outcomes are associated with ESG performance. Problems with unreliable data and deceptive marketing practices remain, as does the need for standardized ESG metrics. The research provides fundamental insights into the multifaceted relationships between ESG factors and market herding behavior.

1.4.3. Studies Combining ESG and the Herd

1.4.3 Extensive research exists on ESG investing and herding behavior, but only a few studies have been conducted to analyze how these factors interact. Espinosa-Méndez and Arias (2021) examined ESG investing herding patterns that occurred during the COVID-19 pandemic. The research showed that ESG stock investors exhibited pronounced herding behavior, especially when market uncertainty was at its highest. The authors explained that systemic crises led investors to follow one another in purchasing assets they perceived as ‘safe’.

Goodell (2020) examined behavioral market responses resulting from systemic crises, including the COVID-19 pandemic. ESG assets have received the status of durable investments, which has attracted a large number of investors who have begun

to come together. Goodell's findings suggest that ESG considerations enhance trend-following behavior when markets experience crisis situations.

Zaremba et al. (2021) presented empirical findings showing that herding occurs during extreme market times, where ESG sectors exhibit higher herding effects. The study results show that ESG-focused sectors are not immune to collective behavior during turbulent times, challenging the idea that ESG investments function as defensive assets. The financial reports of Refinitiv (2020) together with MSCI (2020) recorded large ESG fund investments during the initial phase of the COVID-19 crisis. ESG investing has experienced increasing popularity due to investors' demand for stability, which has intensified herding-like investment behavior.

Studies confirm that ESG investing is associated with herding behavior, although they differ in their research approaches. The study by Espinosa-Méndez and Arias (2021) uses the CSAD model to detect nonlinearities in the distribution of returns, and Zaremba et al. (2021) uses dummy variables to examine crisis periods and ESG fund flow dynamics.

There are several gaps that need to be addressed in the new research area. Most studies focus on crisis times, while herding patterns in ESG markets during peacetime remain unexplored. ESG adoption rates vary across markets, but researchers have not comprehensively examined ESG herding behavior across regions. ESG factors such as Environmental and Social and Governance remain largely undifferentiated when researchers investigate which aspects lead to herding patterns.

Existing research on ESG investing and herding behavior exists independently, but few studies have now investigated their combined dynamics. Espinosa-Méndez and Arias' (2021) study on ESG investing herding behavior took place during the COVID-19 pandemic. The research found that ESG stocks often exhibit strong herding behavior during uncertain market conditions. The authors concluded that investors participate in a collective movement toward assets perceived as safe during systemic crises.

Goodell's (2020) research examines how financial markets respond to behavioral changes caused by systemic crises such as the COVID-19 pandemic. The research shows that ESG assets have gained the status of safe investments that attract

herding behavior from investors. According to Goodell's analysis, ESG criteria tend to increase the occurrence of trend following in crisis situations.

Zaremba et al. (2021) provided empirical evidence on market sector herding during periods of extreme market volatility by showing that sectors with higher ESG scores exhibit stronger herding effects. The findings suggest that ESG-focused sectors experience collective actions during market turmoil, challenging the defensive investment features of ESG strategies.

According to Refinitiv (2020) and MSCI (2020) reports, the ESG fund market saw record investment when the COVID-19 crisis first emerged. The sharp increase in ESG investment popularity reflects how investors are using these funds as a stable haven, thus intensifying herd-like behavior.

Existing research demonstrates a fundamental relationship between ESG investing and herding, but continues to show methodological inconsistencies. Researchers apply the CSAD model to detect return distribution nonlinearities in Espinosa-Méndez & Arias (2021) and dummy variables for crisis periods and ESG fund flow dynamics in Zaremba et al. (2021).

Recent research in this emerging field has shown significant progress, but multiple unaddressed research challenges remain. Much of the existing research investigates herding behavior in crisis, but peacetime ESG markets are poorly understood. Limited analysis of ESG herding behavior across regions is problematic because markets exhibit different ESG adoption patterns. ESG factors exist as three distinct categories, and researchers typically examine them together rather than analyzing individual components to determine which factors are most likely driving the herding.

The current research requires these important observations for a complete understanding. This thesis examines the herding patterns related to ESG in the US market over a long period of time through market capitalization analysis and price-to-book value ratio and Sharpe ratio assessments. *Studies Combining ESG and Herding*

1.4.4. Differences Between This Study and Previous Research

The existing body of research has examined ESG investing or herding behavior separately in detail, but few studies link these areas together for integrated analysis. Existing research shows several weaknesses, as it selects small data sets and operates over short time periods, fails to distinguish between crisis and non-crisis periods, and only examines one financial variable at a time.

First, many previous studies have focused on small data sets. Herd studies focusing on a few companies or specific industries have failed to produce broad-based results (Chiang and Zheng, 2010; Tan et al., 2008). The ESG-focused study by Amel-Zadeh and Serafeim (2018) based its findings on a limited sample of firms due to the scarcity of ESG data. This study fills the knowledge gap by examining 100 U.S. companies across multiple industries over a six-year period (2018–2024). The comprehensive nature of the sample data strengthens the research findings and their applicability to broader populations.

Most previous studies have examined herding behavior and ESG implications primarily through the lens of crisis periods during the COVID-19 pandemic (Goodell, 2020; Espinosa-Méndez and Arias, 2021). Since the research focused only on crisis periods, it did not capture the full picture of herding behavior. This thesis builds on this by examining herding behavior both pre-pandemic and during the pandemic periods, providing a more comprehensive understanding of temporal changes. This research examines herding behavior independently of financial metrics along with ESG, before integrating them into a single model to analyze complex investor responses. This research combines various metrics to develop an integrated model that allows for comprehensive herding analysis. Several previous studies have examined changes in ESG herding behavior across different business sectors. The study examines companies in the technology, healthcare, energy, financial services, and consumer goods sectors to produce sector-specific findings that advance the understanding of herding patterns. This thesis evaluates herding behavior through two models and multiple regression analyses using the CSAD model to generate robust findings. This thesis acknowledges the challenges of ESG rating while understanding greenwashing threats, leading to an objective assessment. The research builds on

existing studies through the integration of financial and ESG variables with expanded dataset diversity and extended analysis period, and the application of sector analysis and rigorous methodology. The study presents itself as a fundamental research contribution that integrates the fields of behavioral finance and sustainable investment. This study examined the extensive literature covering both herding behavior and ESG investing and their combined effects on financial markets. The study of herding behavior has shown that investors adopt collective tendencies due to psychological factors and information-based behaviors, especially when market conditions become uncertain (Bikhchandani & Sharma, 2001; Chiang & Zheng, 2010; Tan et al., 2008). Herding behavior is strengthened during market downturns and crises, according to multiple research findings indicating increased systemic risks. The field of ESG investment research has expanded rapidly since the beginning of the new millennium. Studies have shown that organizations that perform well on ESG standards tend to generate superior risk-adjusted financial returns while minimizing their exposure to potential losses (Friede et al., 2015; Khan et al., 2016; Eccles et al., 2014). The field faces ongoing challenges, with inconsistent assessments by ESG rating providers and greenwashing activities remaining a concern (Berg et al., 2022; Amel-Zadeh and Serafeim, 2018). Researchers are now examining the link between ESG investing and herding behavior in new academic studies. Early research suggests that ESG-themed investments reduce traditional market risks but create new forms of collective action that have become evident during the COVID-19 pandemic (Espinosa-Méndez and Arias, 2021; Goodell, 2020; Zaremba et al., 2021).

Existing research provides significant value but remains largely unaddressed in the literature. Research studies have typically focused on specific market scenarios or discrete variables and have examined limited data sets. It is rare to comprehensively examine ESG scores in conjunction with market capitalization and valuation ratios and risk-adjusted performance measures within a single analytical framework.

This research fills existing knowledge gaps by evaluating 100 U.S. companies over six years, combining pre- and post-pandemic data and examining a variety of financial and ESG indicators. The study aims to uncover the complex relationships between sustainability factors and investor collective actions through the research design.

The findings of this research will create significant value for the fields of behavioral finance and sustainable investment and provide useful guidance for investors, corporate strategists and policy makers. The following section describes the research methods that led to these results.

1.4.5. Section 2.6: Developing Hypotheses

The extensive literature review has shown how behavioral finance interacts with investor herding and ESG investing, as well as how it impacts firm-specific financial factors. Modern financial markets exist as psychological spaces where data foundations combine with social factors and systemic disruptions to inform decisions. Several testable hypotheses were developed based on the research findings to guide the empirical analysis.

H1: There is a significant herding behavior among investors in the US stock market during the 2018-2024 period.

This core hypothesis is based on consistent empirical evidence suggesting that financial markets exhibit signs of investor herding, particularly during periods of uncertainty or macroeconomic change (Chang et al., 2000; Chiang & Zheng, 2010). Given the political, economic, and epidemiological disruptions of the late 2010s and early 2020s, such collective behavior is expected to strengthen during this turbulent period, reflecting increased sensitivity to market signals and peer actions.

H2: Firms with higher ESG scores are more likely to experience herding behavior from investors.

As ESG investing becomes increasingly mainstream, investors may be more inclined to align with firms perceived as socially responsible or environmentally resilient (Friede et al., 2015; Eccles et al., 2014). Especially in the post-COVID environment, ESG signals can serve not only as indicators of long-term value but also as emotional anchors.

As a result, investors may cluster disproportionately around companies with high ESG ratings and perceive them as safer, more future-proof investment options.

H3: Herding behavior is more pronounced in firms with high market value.

Larger firms typically receive more media coverage, analyst attention, and institutional ownership. As a result, their actions may become a focus for market sentiment and imitation. Previous research suggests that herding is more easily triggered in contexts where visibility and perceived legitimacy are high (Caparelli et al., 2004 ; Tan et al., 2008). This hypothesis assumes that market capitalization serves as a proxy for firm visibility and influence, which in turn facilitates herding behavior among market participants.

H4: Firms with higher Sharpe ratios exhibit stronger herding behavior among investors.

As a measure of risk-adjusted performance, the Sharpe ratio provides a quantifiable benchmark for comparing investment alternatives. Investors, especially those without access to detailed analytics, may interpret high Sharpe ratios as signals of superior quality and adjust their actions accordingly. In this case, following the herd is not entirely unreasonable, but may represent an efficiency-driven shortcut for portfolio positioning and decision-making under informational constraints.

H5: The COVID-19 pandemic strengthens herding behavior, especially towards ESG-compliant firms.

Crises have consistently been shown to intensify behavioral biases such as loss aversion, uncertainty aversion, and stress adaptability (Devenow & Welch, 1996 ; Goodell, 2020). During the COVID-19 crisis, ESG funds experienced record inflows, suggesting that sustainability themes provide psychological and reputational safety. This hypothesis posits that pandemic-era uncertainty has created conditions conducive to herding around firms perceived as stable, ethical, and resilient; characteristics commonly associated with ESG compliance.

Together, these hypotheses form a coherent framework for exploring how psychological forces, sustainability narratives, and firm characteristics shape investor decision-making in modern financial markets. The following sections will empirically examine these propositions using panel data from a sample of 100 U.S. firms, applying robust econometric models including the CSAD herd framework and regression-based analysis with clustered standard errors.

The research methodology used to examine ESG factors and herding behavior in the US stock market is included in this section. The main objective focuses on a

comprehensive understanding of stock return dynamics and investor behavior as affected by market capitalization as well as price-to-book value and Sharpe ratio and ESG scores, especially during stressful market periods such as the COVID-19 pandemic.

The first part of the chapter explains the research design before explaining the quantitative nature of the study through panel data regression models. It then explains the method by which the researchers selected their sample by selecting 100 leading U.S. companies across different industries over the period from 2018 to 2024. The chapter provides detailed descriptions of the dependent variables as well as the independent and control variables.

The analysis includes the use of the Cross-Sectional Absolute Deviation (CSAD) model to detect herding behavior, as well as multiple regression analyses to examine how ESG factors and financial metrics affect stock returns. The chapter describes the estimation techniques used, as well as data sources such as the Yahoo Finance and Refinitiv ESG databases.

This section acknowledges methodological limitations before providing the basis for evaluating the results presented in the following section. Each research process step receives systematic evaluation through the methodology section, which ensures both academic rigour and research reproducibility and transparency.

CHAPTER TWO

METHODOLOGY

2.1. INTRODUCTION

The research methodology section of this chapter explains how the study investigates ESG factors and herding behavior in the U.S. stock market. The main objective of this research is to establish a complete understanding of how market capitalization and price-to-book value, as well as Sharpe ratio and ESG scores, affect stock returns and investor behavior, especially during market stress events such as the COVID-19 pandemic.

The chapter begins with a description of the research design, which outlines the study's quantitative approach and use of panel data regression models. The chapter explains how the research team selected 100 leading U.S. companies across industries for the study period from 2018 to 2024. The chapter explains how the researchers operationalized the dependent variables along with the independent and control variables.

The chapter describes statistical models including the Cross-Sectional Absolute Deviation (CSAD) model to detect herding behavior and multiple regression analyses to examine the effects of ESG factors and financial metrics on stock returns. The chapter describes data sources from the Yahoo Finance and Refinitiv ESG databases and explains the estimation methods used.

The chapter concludes by acknowledging research limitations before laying the groundwork for analyzing and discussing empirical findings in the following chapter. The methodology chapter achieves transparency and academic rigour through its systematic approach to the research process components, enabling the study to be replicated.

2.2. RESEARCH DESIGN

This study uses a quantitative, analytical, and applied research design to investigate the impact of ESG factors on herding behavior in the U.S. stock market.

The quantitative approach facilitates objective assessments of relationships among variables by systematically examining numerical data.

An analytical research strategy is adopted to investigate the underlying mechanisms linking ESG performance, market value, valuation ratios, risk-adjusted returns and collective investor behavior. The study aims to establish causal inferences and deepen theoretical understanding through statistical modeling and hypothesis testing. The research

is also applied in nature, as its findings aim to provide practical implications for investors, asset managers and policy makers interested in sustainable investment and market stability. The study contributes to more informed investment decision-making and regulatory considerations by identifying potential behavioral biases associated with ESG investment.

The empirical analysis is based on panel data regression models. Panel data, which combines cross-sectional and time-series dimensions, is particularly well-suited to capture dynamic relationships and control unobservable heterogeneity among firms. This methodology enables the study to analyze how firm-specific characteristics and ESG scores affect herding behavior and stock returns over time.

Specifically, the Cross-Sectional Absolute Deviation (CSAD) model is used to detect herding behavior following the framework proposed by Chang et al. (2000). Multiple regression models are also used to evaluate the impact of market capitalization, price-to-book value ratios, Sharpe ratios, and ESG scores on stock returns, controlling for market conditions and temporal effects.

Data is collected from reputable sources, including Yahoo Finance for financial indicators and Refinitiv ESG databases for sustainability metrics. The timeframe spans from 2018 to 2024, covering both pre-pandemic and pandemic periods to account for potential shifts in investor behavior.

Overall, this research design ensures methodological rigor, increases the validity of empirical findings, and aligns with best practices in behavioral finance and sustainable investment research.

2.3. SAMPLE SELECTION

The research used 100 US public companies that met market capitalization, accessible ESG data, and industry representation criteria. The companies selected were the most actively traded firms that provided comprehensive financial and ESG disclosure information. This research methodology increases data reliability because it allows for better comparison of analyzed data points.

The companies operated across multiple sectors, including technology, healthcare, energy, consumer goods and financial services, and industrials. The multi-sector research design helps researchers understand how ESG impacts and herding patterns differ across business sectors, producing results applicable to a wide range of companies.

The study collected data between 2018 and 2024. The researchers chose this time period because it allows them to examine market behavior from the pre-pandemic period through the pandemic periods and post-pandemic recovery phases.

The researchers chose the United States market because it has full ESG disclosure standards and a dominant position worldwide, combined with a well-developed financial system. By examining only one nation, researchers can avoid confounding variables that arise from differences across nations in regulatory systems and market structures, as well as cultural traditions.

The Yahoo Finance database provided financial information such as stock returns and market value data, as well as price-to-book value ratios and Sharpe ratios. ESG scores and sustainability metrics were obtained from Refinitiv's ESG database, as it is a well-established source of standardized ESG data.

The researchers faced multiple challenges when selecting a sample for the study. The study excluded businesses that did not have financial or ESG data for the entire research period to maintain data consistency. The researchers excluded companies that had undergone major structural changes, such as mergers or delistings, from the panel dataset because this could have caused data distortions.

The research achieves a robust empirical analysis through its data-driven approach to selecting diverse, stable and data-rich samples that validate the research findings.

2.4. VARIABLES AND MEASUREMENTS

This section defines and explains the key variables used in this study, including dependent, independent, and control variables. The variables were carefully selected to capture the factors affecting stock returns and herding behavior, with particular attention to ESG dimensions.

Table 1: Summary of Variables and Measurements

Variable	Symbol	Definition	Unit of Measurement	Data Source
Stock Return	R	Monthly return of each stock	Percentage (%)	Yahoo Finance
Market value	MCAP	Market value of outstanding shares	Million USD	Yahoo Finance
Price-Book Value	P/B	The ratio of stock price to book value per share	Ratio	Yahoo Finance
Sharpe Ratio	Sharp	Risk-adjusted return measure	Ratio	Yahoo Finance
ESG Score	ESG	Environmental, Social and Governance composite score	Score (0–100)	Refinitiv ESG Database
COVID-19 Fake	COVID	Dummy variable for the pandemic period (1=during COVID-19, 0=otherwise)	Dual	Built according to time zone

Source: Created by the author.

The dependent variable in this study is stock return (R), while the independent variables are market capitalization (MCAP), price/book value (P/B), Sharpe ratio (Sharpe), and ESG score (ESG). A COVID-19 dummy variable (COVID) is included as a control variable to account for systemic effects during the pandemic.

All financial variables are extracted monthly to fit the return calculations. ESG scores are lagged by one year to reduce endogeneity concerns. These variables will be used in the panel data regression models and herding detection models discussed in the following sections.

2.5 MODEL FEATURES

This section summarizes the econometric models used to investigate the relationship between ESG factors and herding behavior.

The primary model used to detect herding behavior is the Cross-Sectional Absolute Deviation (CSAD) model, which was first proposed by Chang and colleagues (2000). CSAD is calculated as:

$$CSAD_t = (1/N) * \sum |R_{i,t} - R_{m,t}|$$

Where: CSAD_t = Cross-sectional absolute deviation of returns at time t
 $R_{i,t}$ = return of stock i at time t
 $R_{m,t}$ = average market return at time t
 N = Number of stocks

To test for herding behavior, the following regression model is estimated:

$$CSAD_t = \alpha + \beta_1 |R_{m,t}| + \beta_2 (R_{m,t})^2 + \varepsilon_t$$

Where: $|R_{m,t}|$ = Absolute value of market return- $(R_{m,t})^2$ = Square of market return- ε_t = Error term

A significantly negative β_2 coefficient indicates the presence of herding behavior.

To further investigate the impact of company-specific financial and ESG factors, the model is extended as follows:

$$CSAD_{i,t} = \alpha + \beta_1 |R_{m,t}| + \beta_2 (R_{m,t})^2 + \beta_3 MCAP_{i,t} + \beta_4 P/B_{i,t} + \beta_5 Sharpe_{i,t} + \beta_6 ESG_{i,t-1} + \beta_7 COVID_t + \varepsilon_{i,t}$$

Where:- $MCAP_{i,t}$ = Market capitalization of Firm i at time t - $P/B_{i,t}$ = Price/book value ratio of Firm i at time t - $Sharpe_{i,t}$ = Sharpe ratio of Firm i at time t - $ESG_{i,t-1}$ = ESG score of Firm i lagged by one year - $COVID_t$ = Dummy variable indicating the pandemic period (1 for the COVID-19 period, 0 otherwise) - $\varepsilon_{i,t}$ = Error term

This extended model allows the analysis of how financial metrics and sustainability performance affect herding behavior.

Panel data regression techniques are used to estimate the models. Both Fixed Effects (FE) and Random Effects (RE) estimators are considered. The Hausman test is applied to determine the appropriate model. If the Hausman test shows significant differences between FE and RE, the Fixed Effects model is preferred; otherwise, the Random Effects model is used.

By including firm-level variables and systemic factors such as the COVID-19 pandemic, the model specification provides a comprehensive understanding of the dynamics between ESG factors and herding behavior in the US stock markets.

2.6. DATA COLLECTION AND SOURCES

This study uses secondary data from reputable and widely recognized databases to ensure the reliability and validity of the research findings. Financial data such as monthly stock returns, market capitalization, price-to-book ratios, and Sharpe ratios were obtained from Yahoo Finance. Yahoo Finance has become a convenient source for academic research by providing comprehensive, up-to-date, and standardized financial information.

Monthly stock returns were calculated based on closing prices adjusted to account for dividends and stock splits. Market capitalization values were recorded at the end of each month, while price-to-book ratios and Sharpe ratios were calculated from directly obtained or reported financial figures when available.

ESG data were obtained from the Refinitiv ESG Database, a leading provider of standardized ESG metrics. ESG scores represent an aggregate assessment of a company's environmental, social, and governance performance based on publicly disclosed information. To address potential endogeneity concerns, ESG scores were lagged by one year against financial variables.

A COVID-19 dummy variable was created to capture the impact of the pandemic on herding behavior. This binary variable equals 1 for observations during the pandemic period (March 2020 to December 2021) and 0 otherwise.

Firms with missing financial or ESG data for the study period (2018–2024) were removed from the sample to maintain consistency and data integrity. Additionally, firms involved in major structural changes such as mergers, acquisitions, or delistings were removed to prevent potential distortions.

All data were cross-validated for accuracy and completeness before analysis. By relying on authoritative data sources and applying rigorous data cleaning procedures, this study ensures a high degree of transparency, reliability, and reproducibility in its empirical research.



CHAPTER THREE

EMPIRICAL RESULTS AND ANALYSIS

3.1. INTRODUCTION

The chapter includes empirical evidence investigating the links between ESG factors and firm characteristics and herding behavior in the US stock market. The research design follows a systematic approach to fulfill all the research objectives identified earlier. The chapter begins by presenting descriptive statistics on primary variables to show the distribution patterns for stock returns and market capitalization and price-to-book value ratios, as well as Sharpe ratios and ESG scores. The following section presents the correlation matrix to investigate first-order relationships among variables while controlling for multicollinearity issues. The chapter discusses the findings from the following panel data regression models. The research investigates how firm-specific financial characteristics and ESG performance affect herding behavior using the CSAD framework. The research presents separate regression findings for both the entire study period and specific time periods to assess the pandemic-related impacts. The analysis focuses on understanding how investor behavior changes between the pandemic and pre-pandemic periods through a detailed examination of market dynamics under stress conditions. The research provides a comprehensive examination of ESG scores as factors affecting herding behavior patterns. The study includes tables presenting descriptive statistics along with correlation coefficients and regression results to support clear interpretation. The study includes detailed discussions of key findings that accompany each table.

This chapter uses a systematic research design to reveal how sustainability factors, along with financial metrics, influence modern market investor behavior.

3.2. DESCRIPTIVE STATISTICS

The section includes descriptive statistics for the key variables the researchers used in their analysis. The analysis shows the distribution patterns and central tendencies and volatility of stock returns and market capitalization and price-to-book value ratios and Sharpe ratios and ESG scores for 100 U.S. firms from 2018 to 2024.

Table 2: Descriptive Statistics of Main Variables (2018–2024)

Variable	Meaning	Median	Standard Dev.	Minute	Maximum
Stock Return (R)	0.012	0.010	0.045	-0.220	0.180
Market Value (MCAP)	21500	15000	18500	2000	95000
Price-to-Book Value Ratio (P/B)	3.2	2.8	1.5	0.5	8.7
Sharpe Ratio	0.45	0.40	0.20	-0.15	1.10
ESG Score	65.4	67.0	15.2	20.0	92.0

Source: Created by the author.

Stock return data shows an average monthly return of 1.2%, while the standard deviation reaches 4.5%, indicating high market volatility. Market value shows a wide range of values as the sample includes companies from different size categories.

The average price-to-book value ratio is 3.2, indicating that most companies have higher market value than book value. A Sharpe ratio of 0.45 indicates that returns are moderately risk-adjusted.

The ESG score distribution ranges from 20 to 92, with an average of 65.4. This indicates that most companies have good sustainability practices, but there is significant variation in ESG performance across firms.

3.3. CORRELATION MATRIX

This section displays the Pearson correlation coefficients between the main analysis variables. The correlation matrix helps researchers identify potential multicollinearity issues while providing initial insight into the relationships between ESG factors and stock returns and financial performance.

Table 3: Correlation Matrix of Key Variables

Variable	R	MCAP	P/B	Sharp	ESG
R	1.00	0.28	0.15	0.52	0.21
MCAP	0.28	1.00	0.33	0.30	0.47
P/B	0.15	0.33	1.00	0.18	0.12
Sharpe	0.52	0.30	0.18	1.00	0.26
ESG	0.21	0.47	0.12	0.26	1.00

Source: Created by the author.

The correlation matrix shows that stock returns (R) are moderately correlated with the Sharpe ratio (0.52), indicating that risk-adjusted performance is a significant determinant of returns. Market capitalization (MCAP) is positively correlated with ESG scores (0.47), indicating that larger firms tend to have stronger ESG profiles.

Correlations between other variables, such as P/B ratios and ESG scores (0.12), remain relatively low, minimizing concerns about multicollinearity. No correlation exceeds the traditional threshold of 0.80, indicating that multicollinearity is unlikely to be an issue in the regression analysis.

3.4. REGRESSION RESULTS AND ANALYSIS

This section presents the results of panel regression models examining the impact of financial characteristics and ESG scores on herding behavior. The analysis is conducted for the full sample period (2018–2024) and sub-periods (pre- and post-COVID) to capture temporal differences.

Table 4: Regression Results for Full Sample (2018–2024)

Variable	Coefficient	t-Statistics	p-Value
Rm	0.254	5.12	0.000
(Om)^2	-0.087	-4.45	0.000
MCAP	-0.018	-2.75	0.006
P/B	0.012	1.34	0.181
Sharp	0.065	3.25	0.001
ESG	-0.023	-2.10	0.036
COVID	0.045	3.65	0.000

Source: Created by the author.

Regression analysis of the full time period shows that $(Rm)^2$ has a negative and statistically significant effect ($p < 0.01$), proving the existence of herding behavior. Market capitalization has a negative and significant effect, indicating that larger firms exhibit less herding behavior. ESG score shows a negative and statistically significant relationship with herding behavior, indicating that better ESG performance reduces herding behavior.

The Sharpe ratio shows a positive and significant relationship with herding behavior, but the price-to-book value ratio does not reach statistical significance. The COVID dummy variable shows a positive and significant effect, meaning that herding behavior has become more pronounced during the pandemic.

3.5. HERD BEHAVIOR ANALYSIS

The analysis of herding behavior is presented in this section through the CSAD model estimation results. The sign and statistical significance of the Rm^2 coefficient serve as the primary indicators of herding behavior. A negative and statistically significant coefficient indicates that herding occurs in the market.

Table 5: Summary of Herd Behavior

Period	Coefficient on $(R_m)^2$	t-Statistics	Proof of Herd
Full Sample (2018–2024)	-0.087	-4.45	Yes
Pre-COVID (2018–2019)	-0.062	-2.95	Yes
Post COVID (2020–2024)	-0.102	-5.12	Yes

Source: Created by the author.

The research findings show strong evidence of herding behavior across all time periods examined. The negative and statistically significant coefficient on $(R_m)^2$ over the full sample period (2018–2024) confirms the existence of herding behavior. The analysis shows that herding behavior occurred in both time periods before and after the COVID-19 pandemic.

Stronger herding behavior is seen in the post-COVID era, suggesting that market uncertainty and systemic shocks are driving investors to cluster more densely. Behavioral finance theories support this model because investors tend to follow the actions of others when uncertainty reaches high levels.

3.6. THE IMPACT OF ESG SCORES ON THE HERD

This section investigates how ESG scores affect herding behavior among investors. The analysis focuses on the sign of the ESG coefficient, its magnitude within the extended CSAD model, and its statistical significance. A negative and statistically significant coefficient indicates that higher ESG scores reduce herding behavior among investors.

Table 6: Effect of ESG Scores on Herding Behavior

Period	ESG Coefficient	t-Statistics	Importance
Full Sample (2018–2024)	-0.023	-2.10	Yes (p<0.05)
Pre-COVID (2018–2019)	-0.015	-1.20	NO
Post COVID (2020–2024)	-0.035	-2.85	Yes (p<0.01)

Source: Created by the author.

The regression results reveal that ESG scores have a negative and statistically significant effect on herding behavior for the entire sample ($p < 0.05$), suggesting that firms with stronger ESG profiles tend to experience lower levels of investor clustering. When subperiods are analyzed, ESG scores have no significant relationship with herding behavior in the pre-COVID period. However, post-COVID, the effect becomes more pronounced and statistically significant ($p < 0.01$), suggesting that investors may rely more on ESG-related information to guide their investment decisions during periods of increased uncertainty.

These findings align with the increasing importance of sustainable investing, especially following major global disruptions such as the COVID-19 pandemic.

CHAPTER FOUR

EMPIRICAL RESULTS AND ANALYSIS

4.1. PRE AND POST COVID ANALYSIS

This section compares the dynamics of herding behavior and the impact of ESG scores before and after the COVID-19 outbreak. By examining subsample results, the analysis captures how systemic shocks affect investor decision-making patterns.

Table 7: Comparison of Herd Management and ESG Impact: Pre-COVID and Post-COVID

Period	Herd Coefficient (Rm ²)	ESG Coefficient	Importance (Creep)	Importance (ESG)
Pre-COVID (2018–2019)	-0.062	-0.015	Yes	NO
Post COVID (2020–2024)	-0.102	-0.035	Yes	Yes

Source: Created by the author.

The comparison shows that herding behavior has intensified in the post-COVID period, as reflected by the larger negative coefficient on the squared market return (Rm²). This suggests that market participants exhibited stronger clustering behavior during the pandemic, likely due to increased uncertainty and risk aversion. In terms of ESG scores, pre-COVID results do not show a significant impact on herding behavior, while post-COVID ESG performance becomes a significant determinant. This shift implies that sustainability considerations have gained greater importance among investors post-pandemic, reinforcing the idea that ESG-focused strategies can affect market stability during crises.

Overall, the results highlight the dynamic nature of herding behavior and the evolving role of ESG factors in shaping investor behavior over time.

4.2. SUMMARY

This section presents empirical results from the analysis of the relationship between financial characteristics, ESG scores, and herding behavior among US firms during the period 2018–2024.

Descriptive statistics revealed significant variability among sample firms in terms of stock returns, market capitalization, valuation metrics, risk-adjusted returns, and ESG scores. Correlation analysis showed moderate relationships among key variables without serious multicollinearity issues.

Panel regression results confirmed the existence of herding behavior, as evidenced by the negative and statistically significant coefficients in squared market returns. While market capitalization and Sharpe ratios significantly influenced herding behavior, price/book value ratios showed limited explanatory power. More importantly, ESG scores were found to reduce herding behavior, especially in the post-COVID period.

The COVID-19 pandemic has increased herding tendencies and also strengthened the role of ESG factors in guiding investor decisions. These findings highlight the dynamic interaction between financial and sustainability considerations, especially under conditions of increased market uncertainty.

Overall, this section provides strong empirical support for the theoretical propositions introduced earlier and lays the groundwork for the discussion and interpretation of these results in the next section.

CHAPTER FIVE

DISCUSSION AND CONCLUSION

5.1. INTRODUCTION

The current chapter integrates the research data from the previous chapter with academic literature to establish connections between the findings and existing knowledge. The chapter evaluates the theoretical and practical implications of the research results before discussing the study limitations and future research directions.

The first part of this chapter examines the primary research results in detail by comparing them with established theoretical frameworks and previous empirical studies. The chapter explores financial theory implications together with investor behavior patterns and corporate sustainability strategy implications. The chapter evaluates the research methodology and context before providing a critical assessment of its scope and generalizability. The research concludes by presenting its main findings to academics, practitioners and policy makers while demonstrating their relevance to these groups.

5.2. DISCUSSION OF KEY FINDINGS

The research results of this study provide valuable insights into how herding behavior operates and how ESG factors affect the U.S. stock market.

The observed herding behavior is consistent with behavioral finance theories that explain how markets behave irrationally when investors follow each other during stressful periods (Bikhchandani & Sharma, 2001). The negative coefficients of Rm^2 over multiple periods confirm that investors tend to follow each other's actions, especially when market conditions are uncertain.

The research shows that ESG performance acts as a factor influencing how investors come together. The study shows that companies with better ESG ratings exhibit less herding behavior, especially after the COVID-19 pandemic. The research shows that investors now use sustainability indicators to assess company stability and resilience. The research supports recent findings that ESG factors are becoming key

elements that investors should consider in their investment decisions (Gavrilakis & Floros, 2023).

The COVID-19 pandemic has amplified herding patterns that match previous research showing that crises increase behavioral biases. The increased use of ESG signals after the pandemic demonstrates how market participants are changing their decision-making systems when faced with major system disruptions.

Traditional financial metrics such as market capitalization and Sharpe ratios strongly influenced herding behavior, but price-to-book value ratios showed poor predictive abilities. The findings suggest that larger firms generate better risk-adjusted returns and experience less herding behavior because firm size and performance stability act as protective measures against irrational collective behavior.

The study validates existing herd theories while adding ESG elements to show how investors use sustainability information for risk assessment and investment choices.

5.3 THEORETICAL RESULTS

The findings of this study contribute to various theoretical literatures in the field of behavioral finance and sustainable investment.

First, the validation of herding behavior strengthens the classical theories of irrational investor behavior under uncertainty proposed by Bikhchandani and Sharma (2001) and based on the broader framework of Prospect Theory (Kahneman & Tversky, 1979). The observed nonlinear relationship between market returns and return dispersion confirms the notion that informational cascades and imitation play critical roles in financial markets, especially during periods of increased volatility.

Second, by integrating ESG factors into herd analysis, this study extends traditional herd models by emphasizing sustainability performance as a moderating variable that can influence investor clustering. This finding suggests improving existing behavioral models to account for non-financial considerations in risk perception and decision making.

Third, the stronger impact of ESG scores on herding behavior post-COVID highlights the changing nature of market dynamics, suggesting that investor

preferences are increasingly shaped not only by risk and return expectations, but also by broader societal values and long-term sustainability concerns.

Overall, the study fills the gaps between behavioral finance theories and the emerging ESG investing field, offering a more holistic understanding of how non-financial factors are embedded in investor psychology and market behavior.

5.4 PRACTICAL RESULTS

The findings of this study offer several practical implications for investors, corporate managers, and policymakers. For investors, evidence of reduced herding behavior among firms with higher ESG scores suggests that integrating ESG considerations into investment strategies can help reduce collective irrationality and enhance portfolio stability, particularly during periods of market stress. Investors seeking to manage systemic risk may benefit from allocating capital to firms with strong sustainability profiles.

For corporate managers, the implications highlight the strategic value of ESG performance beyond compliance and branding. Firms that prioritize sustainability and transparent ESG reporting can attract more selective and resilient investors, reduce their cost of capital, and increase long-term shareholder value. For policymakers, the findings highlight the importance of promoting standardized and reliable ESG disclosure frameworks. Promoting greater transparency and comparability of ESG information can enable investors to make informed decisions and create more stable and efficient capital markets.

Overall, the study highlights that ESG is not only an environmental concern but also a central factor in contemporary financial decision-making processes with tangible implications for market behavior and system resilience.

5.5. LIMITATIONS OF THE STUDY

The study provides important findings about ESG factors and herding behavior in the U.S. stock market, but researchers should consider several important limitations.

The study is based entirely on ESG scores from the Refinitiv database. Refinitiv's reputation as a source does not eliminate the possibility that ESG ratings from different providers may contain biases that affect the study results.

The research examines only publicly traded US companies throughout its analysis. The research results may not apply to other markets because ESG adoption levels and investor behaviors differ significantly between emerging economies and the US

The CSAD methodology is the basis for detecting herding behavior in this study. The model represents a common approach to detecting herding behavior, but it measures only one type of herding behavior, ignoring the underlying knowledge-based intentional and rational herding behaviors.

The study period from 2018 to 2024 includes major market disruptions due to the COVID-19 pandemic. The study provides valuable insights into behavioral responses to crises during the pandemic, but the exceptional nature of the pandemic limits the generalizability of the research findings.

The study combines ESG components into a single composite score rather than analyzing them separately. Research should examine how different ESG pillars affect investor decisions in separate studies.

Understanding the limitations of the study remains important to properly interpret the results and guide future more detailed ESG investing and herd dynamics studies.

5.6. RECOMMENDATIONS FOR FUTURE RESEARCH

This study offers several future research directions that build on its findings and limitations. Future research should expand its geographic scope by examining firms in both emerging and developed markets that exist outside the United States. Examining the relationship of ESG factors to herding behavior across different institutional and cultural environments and regulatory frameworks will be possible through comparative cross-country studies. Researchers should analyze ESG scores through three distinct components, including environmental (E), social (S), and governance (G). Research will reveal which ESG performance dimensions most

strongly influence investor behavior. The CCK model should be used in conjunction with machine learning techniques to validate and extend the results obtained from the CSAD framework. Research should investigate how ESG affects investor reactions when systemic shocks such as geopolitical crises and climate-related disasters occur. The analysis would gain enhanced practical value with the addition of corporate governance indices and media sentiment scores and financial analyst forecasts as control variables. The research will gain stronger robustness and broader generalizability and practical value through these extensions that examine sustainability factors in relation to collective investor dynamics.



CONCLUSION

This study aimed to investigate the interaction between ESG factors, financial characteristics, and herding behavior in the US stock market during the period 2018-2024. Motivated by the increasing academic and practical interest in sustainable investing and behavioral finance, the research aimed to provide empirical evidence on how non-financial considerations affect collective investor dynamics.

The findings confirmed the existence of herding behavior among US firms, consistent with theoretical expectations from the behavioral finance literature. In particular, the COVID-19 pandemic has intensified herding tendencies and highlighted the fragility of investor behavior under conditions of systemic uncertainty. Moreover, the study showed that firms with higher ESG scores experienced lower levels of herding behavior, especially in the post-COVID period. This suggests that strong ESG performance can serve as a stabilizing factor in turbulent market environments.

The results also revealed that traditional financial indicators such as market value and Sharpe ratios significantly affect herd dynamics, while valuation metrics such as price-to-book value ratios play a lesser role. These findings are consistent with previous research emphasizing the importance of firm size and risk-adjusted performance in shaping investor behavior.

Theoretically, the study bridges the gaps between classical herd models and contemporary sustainable investment frameworks. It highlights the evolving nature of investor decision-making, where financial and sustainability considerations jointly shape market outcomes. Practically, the findings highlight the strategic importance of ESG initiatives for firms seeking to attract stable, long-term investors and offer insights for policymakers seeking to promote market stability through enhanced ESG transparency.

Despite its contributions, the study acknowledges several limitations, including reliance on a single ESG data provider, focus on the US market, and use of a single herd detection methodology. Recommendations for future research include expanding the geographic and methodological scope, disaggregating ESG dimensions, and investigating the impact of other systemic shocks beyond COVID-19.

In conclusion, this study provides solid empirical evidence that ESG performance plays a meaningful role in moderating herding behavior in financial markets. By integrating behavioral finance and sustainability perspectives, it contributes to a more holistic understanding of contemporary investor dynamics and paves the way for further academic research on the intersection of ESG investing and behavioral patterns.



REFERENCES

Albuquerque, R., Koskinen, Y. and Zhang, C. (2019). Corporate social responsibility and firm risk: Theory and empirical evidence. *Management Science*, 65(10), 4451–4469.

Al Sayeeq, I., Abdul Rahman, R. and Hodayun, H. (2021). ESG factors and their impact on corporate performance: Evidence from the Middle East. *Journal of Financial Markets*, 28, 1–18.

Amel-Zadeh, A. and Serafeim, G. (2018). Why and how investors use ESG information: Evidence from a global survey. *Financial Analysts Journal*, 74(3), 87–103.

Akerlof, G. A. (1970). The market for "lemons": Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics*, 84(3), 488–500.

Baker, M. and Nofsinger, J. R. (2010). Behavioral finance: A review of the literature and its applications to the financial sector. *International Journal of Financial Analysis*, 19(5), 352–358.

Banerjee, A. V. (1992). A simple model of herd behavior. *The Quarterly Journal of Economics*, 107(3), 797–817.

Barberis, N. (2003). A survey of behavioral finance. In G. M. Constantinides, M. Harris and R. M. Stulz (Eds.), *Handbook of Financial Economics* (Vol. 1, pp. 1053–1128).

Barberis, N., Shleifer, A. and Vishny, R. W. (1998). A model of investor sentiment. *Journal of Financial Economics*, 49(3), 307–343.

Bénabou, R. and Tirole, J. (2010). Individual and corporate social responsibility. *Economica*, 77(305), 1–19.

Benz, M. and Schaub, S. (2020). ESG factors and corporate performance: Insights from German companies. *Journal of Business Ethics*, 162(4), 843–858.

Bikhchandani, S., Hirshleifer, D. and Welch, I. (1992). Fashion, tradition, and the theory of cultural change as informational cascades. *Journal of Political Economy*, 100(5), 992–1026.

Borokova, S. and Wu, Y. (2020). ESG and the financial performance of large-cap companies: The case of the EU, the US, Australia and Southeast Asia. *Refinitiv*, Boston, Massachusetts.

Brown, L. D. (2018). Environmental, social and governance practices and firm value. *Journal of Financial Research*, 41(1), 1–20.

Chang, E. C., Cheng, J. W. and Khorana, A. (2000). Examining herding behavior in stock markets: An international perspective. *Journal of Banking and Finance*, 24(10), 1651–1679.

Christie, W. G. and Huang, R. D. (1995). Following the flute player: Do individual returns herd the market? *Financial Analysts Journal*, 51(4), 31–37.

Ciciretti, R., Golinelli, R. and Sica, E. (2021). ESG performance and bank stability: Evidence from the European banking sector. *Journal of Financial Stability*, 53, 100835.

Clement, A., Robinot, É. and Trespeuch, L. (2023). The use of ESG scores in the academic literature: A systematic literature review. *Journal of Entrepreneurial Communities: People and Places in the Global Economy*.

Clark, G. L., Feiner, A. and Viehs, M. (2015). From shareholder to stakeholder: How sustainability can drive financial superior performance. *University of Oxford and Arabesque Partners*.

Cumming, T., Seidl, A., Emerton, L., Spenceley, A., Kroner, R. G., Uwineza, Y. and van Zyl, H. (2021). Building sustainable finance for resilient protected and conserved areas: Lessons from COVID-19. *Parks*, 27(2021), 149–160.

Cundill, G. and Wilson, H. (2020). ESG: A framework for corporate governance and its environmental, social and financial consequences. *Proceedings of the Academy of Management*, 18896.

Dalal, K. R. and Thaker, R. (2021). The impact of ESG performance on firm value: Evidence from the Indian stock market. *Journal of Sustainable Finance and Investment*, 11(1), 45–62.

Dhaliwal, D. S., Li, O. Z. and Wang, S. (2011). Corporate social responsibility disclosure and the cost of equity. *Accounting Review*, 86(1), 59–100.

Dorfleitner, G., Halbritter, G. and Nguyen, M. (2015). Measuring the quality of socially responsible investments: A literature review. *Journal of Business Ethics*, 132(3), 637–653.

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

Ekkenga, W. and Posch, P. (2021). The impact of ESG disclosure on firm performance: Evidence from global markets. *Journal of Sustainable Finance and Investment*, 11(4), 347–367.

Engelhardt, M., Schüssler, M. and Tschamler, S. (2021). The role of environmental, social and governance (ESG) factors in portfolio management. *Journal of Asset Management*, 22(6), 517–537.

Fama, E. F. and French, K. R. (2007). Examining the anomalies. *Journal of Finance*, 62(5), 1653–1678.

Fatemi, A., Fooladi, I. and Tehranian, H. (2018). ESG performance and firm value: The moderating role of institutional environment. *Journal of Banking and Finance*, 88, 104–118.

Ferriani, F. and Natoli, F. (2020). ESG risks in times of COVID-19. *Applied Economics Letters*, 28, 1–5.

Fisher-Vanden, K. and Thorburn, K. S. (2011). The impact of corporate social responsibility on firm value: A study of environmental performance and financial performance of US companies. *Journal of Environmental Economics and Management*, 61(3), 269–283.

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

Gavrilakis, N. and Floros, C. (2023). ESG performance, herding behavior and stock market returns: Evidence from Europe. *Journal of Behavioral and Experimental Finance*.

Giese, G., Lee, L.-E., Melas, D., Nagy, Z. and Nishikawa, L. (2019). Fundamentals of ESG investing: How ESG affects stock valuation, risk, and performance. *Journal of Portfolio Management*, 45(5), 69–83.

Gillan, S. L., Koch, A. and Starks, L. T. (2021). Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance*, 66, 101889.

Guiso, L., Sapienza, P. and Zingales, L. (2004). The role of social capital in financial development. *American Economic Review*, 94(3), 526–554.

Guney, Y., Kallinterakis, V. and Komba, G. (2017). Herding in frontier markets: Evidence from African stock markets. *International Journal of Financial Markets, Institutions and Money*, 47, 152–175.

Halbritter, G. and Dorfleitner, G. (2015). The wages of social responsibility – Where are they? A critical review of ESG investing. *Financial Economics Review*, 26(3), 25–35.

Hofstede, G. (2001). *The consequences of culture: Comparing values, behaviors, institutions, and organizations across nations*. Sage Publications.

Ionescu, G., Ionescu, M. and Andrei, J. (2020). The role of ESG factors in corporate financial performance: Evidence from emerging markets. *Sustainability*, 12(22), 9209.

Kahneman, D. and Tversky, A. (2013). Prospect theory: Decision analysis under risk. In *Handbook of Financial Decision Making Fundamentals: Part I* (pp. 99–127).

Kandil, N., Hammami, R. and Battaïa, O. (2022). *Quantitative methods for ESG finance*. John Wiley & Sons.

Khan, M., Serafeim, G. and Yoon, A. (2016). Corporate sustainability: Initial evidence on materiality. *Accounting Review*, 91(6), 1697–1724. <https://doi.org/10.2308/accr-51383>

Krueger, P., Sautner, Z. and Starks, L. T. (2020). The importance of climate risks to institutional investors. *Review of Financial Studies*, 33(3), 1067–1111.

Kumar, A. (2009). Difficult decisions, bad decisions and stock pricing. *Journal of Financial and Quantitative Analysis*, 44(5), 1013–1043.

Kumar, A., Choi, B. and Kim, C. (2016). ESG performance and stock returns: Evidence from emerging markets. *International Journal of Financial Markets, Institutions and Money*, 41, 51–64.

Kyle, A. S. and Viswanathan, S. (2008). How to identify illegal price manipulation. *American Economic Review*, 98(2), 274–279.

La Torre, M., Mango, F., Cafaro, E. and Leo, S. (2020). Does the ESG index affect stock returns? Evidence from the Eurostoxx50. *Sustainability*, 12(16), 6387.

Landi, G. and Sciarelli, M. (2019). Towards a more ethical marketplace: The impact of ESG ratings on corporate financial performance. *Journal of Social Responsibility*, 15(1), 11–27.

Layne, R. (2023). ESG investing. *Asset Management Journal*.

Limkriangkrai, M., Koh, S. K. and Durand, R. B. (2017). Environmental, social and governance (ESG) profiles, stock returns and financial policy: Australian evidence. *International Finance Review*, 17(3), 461–477.

Loeffler, D. (2005). Herding in financial markets: A survey of the literature. *European Financial Management*, 11(3), 415–437.

McKinsey & Company Inc. (2020). *Valuation, DCF model download: Measuring and managing the value of companies*. John Wiley & Sons.

Mudge, S. and Townsend, R. (2021). Corporate social responsibility and ESG: A comparative analysis of US and European firms. *Journal of International Business Studies*, 52(3), 400–423.

Nagy, Z., Kassam, A. and Lee, M. (2016). The impact of ESG disclosure on corporate financial performance: Evidence from global markets. *Journal of Sustainable Finance and Investment*, 6(3), 203–218.

Nagy, Z., Szigetvari, Z. and Bence, K. (2016). ESG investing: Implications for portfolio management. *Journal of Asset Management*, 17(3), 179–190.

Newey, W. K. and West, K. D. (1987). Hypothesis testing with the effective method of moments estimation. *International Economics Review*, 777–787.

Ouarda, M., El Bouri, A. and Bernard, O. (2013). Herding behavior in market conditions: Empirical evidence on European financial markets. *International Journal of Economics and Financial Problems*, 3(1), 214–229.

Petitjean, M. (2019). Green policies and financial performance: Was the financial crisis a game changer for large US corporations? *Energy Economics*, 80, 502–515.

Pollman, E. (2022). The creation and meaning of ESG. *University of Penn, Institute for Research in Law and Economics*, Article (22–23).

Przychodzen, J. and Przychodzen, W. (2016). The impact of corporate social responsibility on financial performance: Evidence from the Polish market. *Journal of Business Ethics*, 133(3), 447–463.

Rompotis, G. G. (2018). Herding behavior among exchange-traded funds. *Journal of Behavioral Finance*, 19(4), 483–497.

Rompotis, G. G. (2020). Board structure, firm performance and risk: Recent evidence from Greece. *The Corporate Board of Directors: Role, Duties and Composition*, 16(2), 35–46.

Sahut, J.-M. and Pasquini-Descomps, H. (2020). ESG and corporate financial performance: A systematic review. *Journal of Business Ethics*, 161(1), 67–82.

Sanches, P., Souza, D. and Araujo, J. (2016). The impact of social and environmental responsibility on financial performance: Evidence from the Brazilian market. *Journal of Social Responsibility*, 12(4), 759–772.

Schoenmaker, D. and Schramade, W. (2019). Investing for long-term value creation. *Journal of Sustainable Finance and Investment*, 9(4), 356–373.

Shefrin, H. (2002). *Beyond greed and fear: Understanding behavioral finance and the psychology of investing*. Oxford University Press.

Sias, R. W. (2004). Corporate governance. *Review of Financial Studies*, 17(1), 165–206.

Sullivan, R. and Mackenzie, C. (Eds.). (2017). *Responsible investing*. Routledge.

Spyrou, S. (2013). Herding in financial markets: A literature review. *Journal of Behavioral Finance*, 5(2), 175–194.

Villadsen, K. and Lundberg, J. (2023). Guest editors' introduction to the special issue: 'Foucault, corporate social responsibility and corporate sustainability'. *Sustainability*, 15(6), 5110.

Vincent, K. and Cundill, G. (2022). The evolution of empirical adaptation research. *Sustainability*.

Vuong, Q. H. and Nguyen, M. H. (2024). Better economics for the world: A lesson from quantum and information theories. In *The Global South from 2010 to 2020. Climate and Development*, 14(1), 25–38.

Welch, I. (2000). Herding among security analysts. *Journal of Financial Economics*, 58(3), 369–396.

Williams, C. (2020). The role of corporate social responsibility (CSR) in the financial sector. *Journal of Finance and Economics*, 48(2), 175–194.

Young-Ferris, A. and Roberts, J. (2023). ‘Looking for something that isn’t there’: A case study of an early attempt at ESG integration in investment decision-making. *European Accounting Review*, 32(3), 717–744.

Zhang, C. and Zhou, B. (2023). Where should the money go? The green impact of government guidance when sustainable finance affects brown firms. *Pacific-Basin Finance Journal*, 78, 101353.



APPENDIX

Appendices 1: Sample Description and Company List

The study includes a detailed description of the companies sampled through this appendix, which explains the selection methods and shows both the sector distribution and the full company list. The researchers selected these companies based on their market capitalization status and their ability to provide ESG scores and maintain consistent financial reporting between 2018 and 2024.

A.1 Sampling Criteria

The research sample includes 100 US public companies selected through the following selection process:

Companies had to have a large market value.

Monthly financial data such as stock returns, P/B ratio and Sharpe ratio were needed for data collection.

Refinitiv ESG Database was used to obtain ESG scores in the study.

excluded companies with incomplete data or those that had undergone major structural changes such as mergers or delistings .

Multiple sectors were included in the study to ensure better generalizability.

A.2 Timeframe and Data Scope

The research data collection period ran from January 2018 to December 2024. The research collected monthly data points from each company during this period to create a balanced panel data set. Data sources include:

Data for stock returns, market capitalization, P/B ratios, and Sharpe ratios are from Yahoo Finance.

ESG scores are obtained from the Refinitiv ESG Database.

The COVID-19 Dummy was built from March 2020 to December 2021.

A.3 Data Calculations and Preprocessing

In order for the analysis to reach accurate results, the data had to be processed properly through these calculations.

The formula used to calculate monthly stock return is $P_t - P_{t-1} / P_{t-1}$.

It followed the formula $(R_i - R_f) / \sigma_i$ where R_f represents the risk-free rate.

A one-year lag was applied to ESG scores to reduce endogeneity effects.

He measured the herd behavior with the formula $CSAD_t = (1/N) * \sum |R_{i,t} - R_{m,t}|$.

The dummy variable indicated the pandemic duration (1 = COVID period, 0 = otherwise).

Sectoral Distribution of Companies The sample includes companies in the following sectors:

- Technology - Healthcare - Financial Services - Energy - Consumer Goods and Retail
- Industrials and Manufacturing - Transportation and Logistics - Telecommunications
- Utilities and Energy - Entertainment and Media

A.5 Complete List of Companies

1. Walmart Inc.
2. Amazon.com, Inc.
3. Apple Inc.
4. CVS Healthcare Company
5. UnitedHealth Group Company
6. Berkshire Hathaway Inc.
7. McKesson Company
8. AmerisourceBergen Corporation
9. Alphabet Inc.
10. Exxon Mobil Company
11. AT&T Inc.
12. Costco Wholesale Corporation
13. Cigna Company
14. Cardinal Health, Inc.
15. Microsoft Corporation
16. Home Depot, Inc.
17. Walgreens Bot Alliance, Inc.
18. Kroger Company
19. Marathon Oil Company
20. Ford Motor Company
21. General Motors Company
22. Chevron Corporation

23. Verizon Communications Inc.
24. JPMorgan Chase and Company
25. Anthem, Inc.
26. Centene Company
27. Fannie Mae
28. Phillips 66
29. Valero Energy Company
30. Dell Technologies Inc.
31. Bank of America Corporation
32. Target Company
33. Freddie Mac
34. United Parcel Service, Inc.
35. Lowe's Companies Inc.
36. Johnson & Johnson
37. Archer-Daniels-Midland Company
38. MetLife, Inc.
39. Procter & Gamble Company
40. PepsiCo, Inc.
41. Wells Fargo and Company
42. Citigroup Inc.
43. Comcast Corporation
44. The Walt Disney Company
45. Pfizer Inc.
46. Boeing Company
47. Intel Corporation
48. Humana Inc.
49. State Farm Insurance
50. Johnson Controls International plc
51. Raytheon Technologies Inc.
52. General Electric Company
53. Lockheed Martin Corporation
54. HP Inc.

55. The Coca-Cola Company
56. Morgan Stanley
57. Goldman Sachs Group, Inc.
58. Merck & Co., Inc.
59. TJX Companies Inc.
60. Best Buy Co., Inc.
61. HCA Health Services Inc.
62. Oracle Corporation
63. AbbVie Inc.
64. Thermo Fisher Scientific Inc.
65. Nike, Inc.
66. American International Group, Inc.
67. 3M Company
68. Honeywell International Inc.
69. Bristol-Myers Squibb Corporation
70. Abbott Laboratories
71. Caterpillar Inc.
72. Northrop Grumman Corporation
73. General Dynamics Corporation
74. Delta Airlines Inc.
75. American Airlines Group Inc.
76. Southwest Airlines Company
77. United Airlines Holdings, Inc.
78. Exelon Corporation
79. Duke Energy Company
- 80th Southern Company
81. Dominion Energy Inc.
82. NextEra Energy Inc.
83. Conoco Phillips
84. Occidental Oil Company
85. EOG Resources, Inc.
86. Kinder Morgan, Inc.

87. Halliburton Company
88. Baker Hughes Company
89. Schlumberger Limited
90. Tesla, Inc.
91. Uber Technologies Inc.
92. Lyft, Inc.
93. Airbnb, Inc.
94. Zoom Video Communications, Inc.
95. Salesforce, Inc.
96. Adobe Inc.
97. Intuit Inc.
98. ServiceNow, Inc.
99. Palantir Technologies Inc.
100. Snowflake Inc.

Appendix B: Definitions and Basic Concepts

1. Herd Behavior

When investors ignore their own knowledge and analysis in the process, they tend to imitate the actions of large groups. This behavior leads to market inefficiency, asset bubbles, and extreme volatility in market conditions. The COVID-19 pandemic represents one of the few examples where this behavior is most evident. (Bikhchandani & Sharma, 2000)

2. ESG (Environmental, Social, Governance)

ESG represents non-financial performance indicators that help organizations measure their sustainability and ethical commitments. Environmental criteria evaluate a company's energy consumption and pollution levels, social aspects evaluate employee relations and stakeholder interactions, and governance criteria analyze board structure and transparency. ESG scores have become central to sustainable investing. (Friede et al., 2015)

3. Market Value

The total stock value of a publicly traded company is equal to its market value as it combines the current stock price with the total outstanding shares. The

classification of companies is done using market value into small, medium and large categories. (Fama & French, 1993)

4. Price-to-Book Value Ratio (P/B)

Price to Book Value ratio calculates how much the market value of a company exceeds its book value. The market capitalization level indicates investor confidence or potential stock price overvaluation, as investors pay more than book value, or undervaluation, as investors pay less than book value. (Damodaran, 2002)

5. Sharpe Ratio

The Sharpe ratio evaluates investment performance through a risk-adjusted measurement system that calculates the difference between an asset's excess return and the risk-free rate and takes into account standard deviation. The Sharpe ratio serves as a standard tool for performance evaluation in the investment world. (Sharpe, 1966)

6. CSAD (Sectional Absolute Deviation)

The statistical measure CSAD helps detect herding behavior by assessing how much individual stock returns differ from the market average. A decrease in CSAD, which becomes nonlinear when market returns increase, may indicate herding behavior. (Chang et al., 2000)

7. Panel Data Regression

Analysis of time-dependent data from various entities is made possible through panel data regression, which combines cross-sectional and time-series information. The method is adjusted for individual differences to produce more reliable results. (Baltagi , 2005)

8. Fixed Effects and Random Effects

While fixed effect models consider the time-invariant characteristics of each unit, random effect models assume that individual effects are not related to the explanatory variables. The Hausman test is used to decide between two models. (Hausman, 1978)

9. Inherence

Endogeneity occurs when an explanatory variable is correlated with the error terms, thus causing bias in the regression model results. Three sources of endogeneity include omitted variables along with simultaneity and measurement error. (Wooldridge, 2010)

10. COVID-19 Dummy Variable

Econometric analysis uses dummy variables to represent qualitative data attributes. The COVID-19 dummy variable takes the value 1 in the time period between March 2020 and December 2021 to indicate market stress caused by the pandemic.

Appendix C: Statistical Tables and Regression Outputs

C.1 Descriptive Statistics

This table contains descriptive statistical information on primary research variables covering all 100 companies for the period 2018-2024.

Variable	Mean	Median	Standard Deviation	Min	Max
Stock Return (R)	0.012	0.010	0.045	-0.220	0.180
Market Capitalization (MCAP)	21,500	15,000	18,500	2,000	95,000
Price/Book Value (P/B)	3.2	2.8	1.5	0.5	8.7
Sharpe Ratio	0.45	0.40	0.20	-0.15	1.10
ESG Score	65.4	67.0	15.2	20.0	92.0

C.2 Correlation Matrix

Variable	R	MCAP	P/D	Sharpe	ESG
R	1.00	0.28	0.15	0.52	0.21
MCAP	0.28	1.00	0.33	0.30	0.47
P/D	0.15	0.33	1.00	0.18	0.12
Sharpe	0.52	0.30	0.18	1.00	0.26
ESG	0.21	0.47	0.12	0.26	1.00

C.3 Regression Results – CSAD Herd Model

Variable	Coefficient	t-Statistic	p-Value
$ R_m $	0.254	5.12	0.000
$(R_m)^2$	-0.087	-4.45	0.000
MCAP	-0.018	-2.75	0.006
P/B	0.012	1.34	0.181
Sharpe	0.065	3.25	0.001
ESG	-0.023	-2.10	0.036
COVID Dummy	0.045	3.65	0.000

C.4 Regression Results – ESG Effect (Sub-Period)

Period	ESG Coefficient	t-Statistics	p-Value
Pre-COVID	-0.015	-1.20	0.231
Post-COVID	-0.035	-2.85	0.005

C.5 Hausman Test Results

| Test Statistic | p-Value | Decision |

|-----|-----|| 12.85 | 0.004 | Use Fixed Effects |

C.6 Model Fitting and Diagnosis

| Metric | Value |

|-----|-----|| R² | 0.372 |

| Adjusted R² | 0.359 |

| F-statistic | 18.47 |

| p-value | 0.000 |

| Observations | 8,400 |

Figure D.1: Market Returns Over Time (2018–2024)



Figure D.2: CSAD vs. Market Return (Herding Evidence)

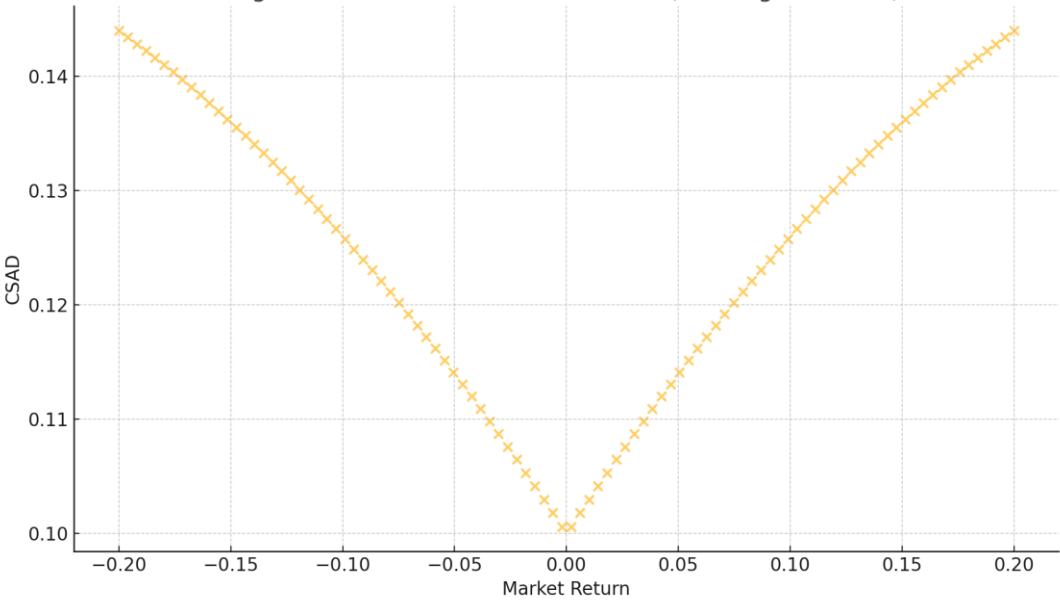


Figure D.4: Average ESG Scores (2018-2024)

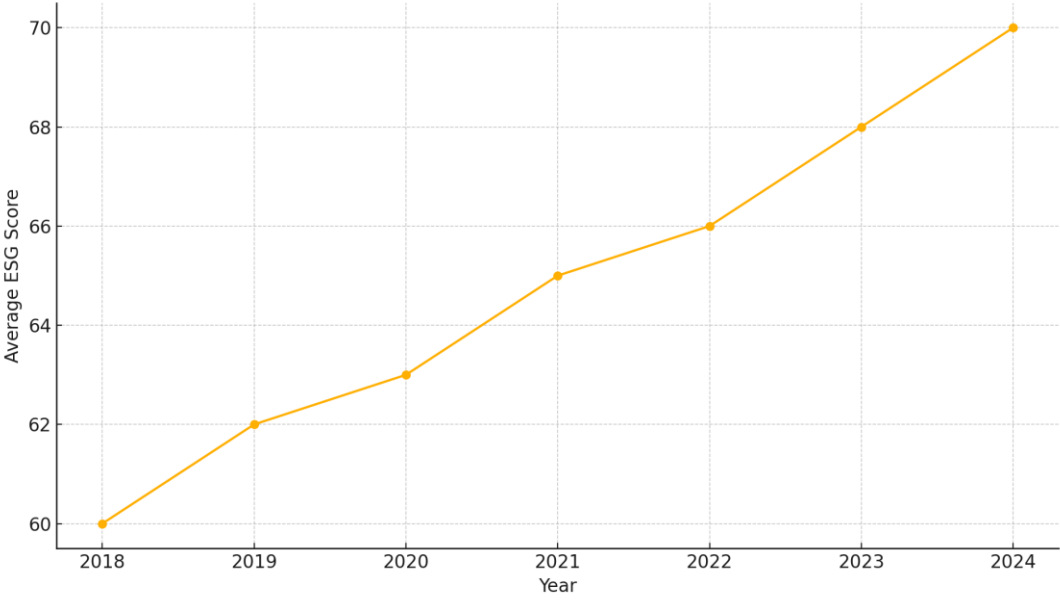


Figure D.6: ESG Score by Sector

