Review

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ESG and Corporate Financial Performance: A Discounted Cash-Flow Perspective with Sustainability Implications

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Abstract: Over the past two decades, researchers and practitioners alike have increasingly aimed to quantify the effects of corporate sustainable practices by studying the relationship between Environmental, Social, and Governance (ESG) metrics and corporate financial performance (CFP). This review employs the Discounted cash-flow (DCF) model to examine financial economics-based research on ESG factors, focusing on their impact on corporate performance through the lenses of cash-flow, idiosyncratic and downside risk, as well as systematic risk channels. The literature reveals four key mechanisms through which ESG characteristics influence CFP, mapped within the numerator (cash-flow) and denominator (discount rate) components of the DCF framework. The link between ESG and cash-flow is examined through analyses of corporate ESG attributes and various financial profitability indicators. Firms with strong ESG performance demonstrate enhanced control over idiosyncratic risk via the cash-flow transmission channel. Additionally, the ESG–cost-of-capital link highlights how reduced systematic and downside risks contribute to improved financial performance. The reported results consistently point to a positive relationship between ESG performance and financial outcomes. This review underscores how ESG strategies not only signal financial strength but also promote alignment with the United Nations Sustainable Development Goals (SDGs). In particular, improved ESG performance supports SDG 8 (Decent Work and Economic Growth) by fostering resilient, long-term business models; SDG 12 (Responsible Consumption and Production) through corporate accountability; and SDG 13 (Climate Action) via environmental risk mitigation. These findings highlight ESG's role as both a financial and sustainability lever, offering insights with far-reaching implications for policymakers, investors, and global sustainability partnerships (SDG 17).

Keywords: ESG investment; sustainability; SDGs; corporate financial performance; idiosyncratic risk; CSR; tail-Risk

1. Introduction

Sustainability is a broad principle that encompasses environmental stewardship, social responsibility, and long-term economic viability. The goal of this principle is to fulfill current needs while ensuring that future generations can meet their own without compromise. Thus, it is a practical tool for implementing and assessing sustainability efforts in the corporate and financial world. ESG metrics are often used as a measurable proxy for sustainability that allow monitoring the achievement of broader goals such as the United Nations Development Goals and long-term value creation.

In recent years, the total value of domestic assets under management (AUM) using sustainable investment criteria grew from $639 billion in 1995 to $17.1 trillion by 2020, and to $52.5 trillion by 2024,

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according to the latest executive report from the US-SIF.[1] Over the same period researchers from both academia and the portfolio management industry have extensively studied the relationship between a company's ESG profile and its financial risk and performance. This growing body of research has led to multiple outlets including a number of meta studies that synthesize findings from a large number of reports (see for example [1]). Although some studies suggest that there is a positive correlation between ESG factors and financial performance, others document negative or negligible relationships. While most researchers have identified a positive link, the overall results remain inconclusive.

ESG is a structured framework used by investors and businesses to assess a company's performance in three specific areas: Environmental (e.g., carbon emissions, resource use), Social (e.g., employee treatment, stakeholder engagement, human rights, and communities), and Governance (e.g., corporate leadership, ethics, transparency, anti-corruption policies, labor equality, executive pay).

This review aims to summarize key findings in the literature related to ESG investing, performance, and company risk by using a fundamentals-based framework based on the benchmark Discounted Cashflow Model (DCF). There is an increasing number of studies from both academia and institutional asset management that have examined the potential financial benefits of ESG investing. [2] provide an extensive review, reporting that over 90% of the literature reveals a non-negative relationship between ESG and financial performance, with the majority indicating positive results (see [3] for a confirmation of this finding.)

One of the causes of the documented inconclusive results lies in the variety of performance metrics and ESG data sources used. The divergence in ESG metrics complicates their use. As [4] notes, variations in ESG scores across different data providers underscore the difficulty of aligning sustainability metrics with the unique characteristics of each firm. Developing a unified framework to evaluate the impact of ESG on corporate performance remains a critical problem to be addressed in order to advance both theory and practice. Several studies underscore how divergence in ESG measurement approaches can lead to different results in relation to performance (see also [5]). [6], address the divergence of ESG scores, emphasizing the difficulty to optimally measuring the intangible qualities of ESG scores. This literature addresses the divergence of ESG scores, highlighting how inconsistent ratings for the same company make it difficult for investors and stakeholders to compare companies reliably (see also [7]).Divergence in scores could also undermine the effectiveness of policies aimed at promoting responsible business practices. The lack of uniformity in the ESG scoring causes confusion, hinders effective decision-making, and limits the ability to drive a genuine and meaningful change in corporate behavior. Understanding the nature of each ESG pillar is a crucial task necessary to establish the theoretical foundations of how sustainability interacts with difficult-to-measure firm characteristics.

Regarding performance, ESG captures hard-to-observe firm characteristics that translate into intangible financial outcomes. Given that establishing the link between ESG and corporate performance has been a challenge, it is important to develop a rigorous framework to assess the impact of critical integration of ESG factors into CFP. According to the US-SIF ESG report for 2020, $16.6 trillion were held by 530 institutional investors, 384 money managers and 1,204 community investment institutions practicing the incorporation of ESG: applying environmental, social and governance criteria in their investment analysis and portfolio selection.

This review follows the work of [8] and uses the DCF model to examine the financial and economic impact of ESG factors focusing on their effect on performance through the lens of cash-flow and systematic risk transmission. The main objective is to discern between causality and correlations by understanding the fundamentals around the transmission channels between ESG and CFP. The analysis performed in this review demonstrates that it is important to differentiate between systematic risk and idiosyncratic characteristics to analyze the impact of ESG dimensions on CFP. Because idiosyncratic risk is typically diversified away by investors by holding a large number of assets, it is only the market

[1] Source: https://www.ussif.org/trends

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or systematic risk that is reflected in the cost of capital as predicted by the Capital Asset Pricing Model (CAPM). Idiosyncratic characteristics are linked to the numerator of the DCF model and therefore affect future cash-flow projections. Corporate specific performance measures are mostly affected by idiosyncratic features that interact under the cash-flow channel. Transparent and active ESG policies are argued to directly enhance profitability, stabilize earnings, and yield higher dividends through this channel. Furthermore, the current review shows that the downside risk (commonly related to systemic and spillover risk) affects corporate performance through a combination of the cash-flow and cost of capital channel.

The following table illustrates how the financial mechanisms identified in this review contribute directly to the achievement of specific UN Sustainable Development Goals (SDGs), highlighting ESG's role not only in improving corporate financial performance but also in advancing global sustainability agendas.

Table 1. Mapping ESG–DCF Mechanisms to UN Sustainable Development Goals

ESG–DCF Mechanism	Explanation	Linked SDG(s)	Relevant SDG Target(s)
Cash-flow Channel (Profitability via ESG)	ESG practices improve operational efficiency, stakeholder trust, and long-term value creation.	**SDG 8** – Decent Work and Economic Growth **SDG 9** – Industry, Innovation	Infrastructure 8.2 – Promote higher levels of productivity through diversification and innovation 9.4 – Upgrade infrastructure for sustainability and efficiency
Idiosyncratic Risk Reduction Strong Institutions	Strong governance and ethical practices lower firm-specific risks, such as reputational and legal risks. 12.6 – Encourage companies to adopt sustainable practices 16.6 – Develop effective, accountable, and transparent institutions	**SDG 12** – Responsible Consumption	Production **SDG 16** – Peace, Justice
Downside Risk Mitigation	ESG helps firms prepare for and absorb environmental, social, and regulatory shocks.	**SDG 12** – Responsible Consumption	Production **SDG 13** – Climate Action 12.4 – Environmentally sound management of chemicals and waste 13.1 – Strengthen resilience and adaptive capacity to climate-related hazards
Cost of Capital Reduction (Systematic Risk Channel)	High ESG scores attract long-term investors and reduce perceived investment risk.	**SDG 8** – Decent Work and Economic Growth **SDG 17** – Partnerships for the Goals	8.10 – Strengthen the capacity of domestic financial institutions 17.3 – Mobilize financial resources for sustainable development

The table outlines how various ESG–DCF (Environmental, Social, and Governance – Discounted Cash Flow) mechanisms align with specific UN Sustainable Development Goals (SDGs) and their targets. It highlights four key mechanisms: Cash-flow Channel, which links ESG-driven profitability to SDGs 8 and 9 through innovation and infrastructure; Idiosyncratic Risk Reduction**, which emphasizes ethical governance to reduce firm-specific risks, aligning with SDGs 12 and 16; Downside Risk Mitigation, which prepares firms for environmental and regulatory shocks, supporting SDGs 12 and 13; and Cost of Capital Reduction, where strong ESG performance attracts investors and lowers risk, contributing to SDGs 8 and 17. Each mechanism is connected to specific SDG targets, showing how financial and sustainability goals can reinforce one another.

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This review is organized as follows. Section 2 describes the ESG investment pillars and compares them with the CSR and SRI criteria. Section 3 describes the cash-flow (CF) transmission channel in connection with CFP and idiosyncratic risk. Section 4 explores the link between ESG/CSR and systematic risk. Section 5 reviews the relationship of the ESG/CSR performance with respect to downside risk under a combination of the the cash-flow and discount rate channels. Section 6 discusses the gaps remaining in the literature. Finally, section 7 offers some concluding remarks.

2. ESG Characteristics Versus CSR and SRI Criteria

Before delving into the research, it is essential to clarify the terminology used in the academic literature. Environmental, Social, and Governance (ESG) investment refers to a strategy that integrates these three key factors into investment decisions, alongside traditional financial metrics. The goal of ESG investing is to support sustainable and ethical business practices while aiming for competitive financial returns. ESG (Environmental, Social, and Governance) was first introduced as an acronym in a 2004 report by the "Who Cares Wins" initiative, initiated in 2004. This has produced several reports focusing on integrating environmental, social, and governance (ESG) factors into financial markets.[2]

While ESG and Corporate Social Responsibility (CSR) are often used interchangeably, they have distinct differences. CSR broadly refers to a firm's voluntary initiatives aimed at being socially responsible and acting as a good corporate citizen. This includes environmentally friendly practices, equal opportunity policies for employees, and investor-friendly strategies that align with social interests. CSR is voluntary, broader in scope than ESG, and focused on corporate contributions to society, with a focus on ethical responsibility and goodwill.

CSR might be seen as a voluntary, public driven initiative, while ESG is an analytical framework used for deeper, long-term financial and social impact evaluations.ESG is data-driven, focused on specific factors (environmental impact, social responsibility, and governance), and primarily used by investors to assess financial and non-financial risks and opportunities.

An important key distinction between ESG and CSR is that ESG explicitly includes governance as a core component, whereas CSR incorporates governance indirectly through its environmental and social dimensions. As a result, ESG provides a more structured and measurable framework compared to CSR.

Socially Responsible Investment (SRI) integrates investment criteria aligned with ESG considerations. SRI encompasses a range of investment products with varying social objectives, from minimizing harm to actively generating measurable social benefits. Unlike ESG, which provides a framework for assessing corporate sustainability, SRI goes a step further by offering specific guidelines for including or excluding investments based on ethical considerations. For instance, an investor may choose to exclude tobacco companies from their portfolio or, conversely, prioritize firms that allocate a significant portion of their profits to charitable causes.

3. The Cash-Flow Transmission Channel, Corporate Value and Performance Versus Idiosyncratic Risk

The cash-flow channel of ESG practices refers to how firm's ESG initiatives impact their financial performance through changes in firm's cash-flow (CF). The literature on this topic explores various mechanisms through which ESG practices influence revenues, costs, and firm's overall CF generation. One of the key effects of ESG practices on corporate cash-flows occurs through revenue growth and market differentiation. ESG initiatives can enhance a company's revenue by attracting consumers who prefer sustainable and ethical products (see [9]). Companies with strong ESG commitments often achieve higher customer loyalty and brand value, leading to stable or increasing revenues (see [10]). Additionally, firms investing in ESG may gain access to new markets and benefit from premium pricing on sustainable products. The positive impact of ESG practices on future CFs can

[2] For more information, see the International Finance Corporation's (IFC) website at [https://www.ifc.org)

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also materialize through cost reduction and efficiency gains. ESG initiatives improve operational efficiency by reducing energy consumption and waste management costs (see [8]). Moreover, the adoption of sustainable supply chain practices has been shown to reduce procurement expenditures and optimize resource utilization. Lastly, companies with strong ESG policies tend to experience higher employee productivity and retention, reducing recruitment and training expenses (see [11]). The different mechanisms through which ESG practices enhance revenues contribute to a firm's competitive advantage, resulting in improved abnormal returns, higher profitability, and increased dividends, (see [12]). In what follows is a summary of the literature that has addressed the ESG-performance link within the cash-flow channel.

3.1. The Link Between Performance, Value and ESG-CSR-SRI Practices

In this subsection, we review the relevant literature concerning the relationship between financial performance, value, and ESG/CSR/SRI.

[13] concludes that ESG can enhance CSR highlighting that further efforts are needed to standardize and supervise ESG practices due to the complexity that arises when comparing metrics across different regions and sectors. ESG investment emerges as a strategy that companies use to differentiate themselves as socially responsible and gain a competitive advantage over their peers. Thus, the cost of ESG investment represents an act of assuming social responsibility in pursuit of future economic benefits and higher long-term profitability. They argue that ESG and CSR are integral to the global financial system. However, they highlight the lack of adequate financial metrics to evaluate their impact and enforce sanctions for non-compliance. Therefore, their arguments align with the cash-flow transmission channel. This consequently creates economic pressure on firms to fulfill their ESG responsibilities. Finally, they emphasize the need for further research on ESG investment from a CSR perspective to deepen the understanding of its contribution to firm value.

The effect of ESG/CSR policies on firm value also takes place under the cash-flow channel. The impact of higher ESG or CSR compliance enhances profitability through higher revenues or lower costs and therefore increasing firm value. The relationship between ESG/CSR policies and firm value has been documented with a mixed effect. Some theoretical studies, such as [6] and [14], suggest that higher ESG performance can increase firm value. They argue that CSR activities can create managerial agency problems. Corporate managers may pursue CSR friendly activities that maximize personal utility at the expense of shareholder welfare, as analyzed in [6]. The academic research identifies various ways sustainability commitments can create firm-specific value. First, CSR activities can enhance shareholder wealth by increasing cash-flows (e.g., attracting investors, improving employee satisfaction and productivity).[3] Second, ESG activities may create value by maximizing shareholder utility. Beyond higher cash-flows, shareholders might value the environmental and social benefits of ESG practices, deriving greater utility from responsible firms even if cash-flows remain unchanged compared to irresponsible firms. In a seminal contribution [15] examine both the financial and real world impacts of sustainable investment within a highly manageable equilibrium framework. In doing this they discuss how agents obtain higher utility from holdings of green firms and dis-utility from investing in a brown paper brown firm.

[16] use panel data from Chinese listed companies from 2017 to 2021, with Reuters as the source for stock prices and ESG scores. They find that ESG scores negatively correlate with Tobin's Q, indicating that Chinese stocks tend to be undervalued as their ESG ratings increase. While the social and governance pillars are insignificant; only the environmental score explains this correlation. Their results remain robust with fixed effects. When ROA is used as a dependent variable, none of the ESG factors is significant, implying that investment in ESG does not substantially improve ROA. Similar results are observed with ROE. They conclude that ESG practices are not fully reflected in financial

[3] This literature also discusses the role of lower discount rates (e.g. lowering the cost of capital) in increasing firm value. This will be addressed in section 4.

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performance as ESG remains a relatively new concept not yet integrated as a core corporate strategy in China.

The relationship between ESG and CFP may also work in the reverse direction: higher-value firms with strong financial performance may exhibit higher ESG scores, as larger firms are better equipped to allocate resources to ESG activities. The data supports this association, with higher CSR performance often seen in firms with greater resources and in developed countries. This is explained by the size factor related literature which is relatively extense in the ESG landscape.

The work of [17], examines the relationship between corporate social responsibility (CSR) and firm performance, considering firm size as a key factor. It finds that larger firms tend to have more structured CSR activities and greater capacity to engage in socially responsible practices. Although this paper focuses primarily on CSR, the findings are relevant for ESG, as CSR is an essential component of the "S" (Social) factor in ESG. [18], look at how companies that adopt sustainability practices (including ESG factors) perform over time, with a focus on large versus small companies. The authors find that firms with robust sustainability practices tend to perform better financially in the long run, and this effect is particularly strong for large companies due to their ability to invest more in sustainability.

[19], investigate the relationship between company size, ESG performance, and financial performance. They find that larger firms tend to perform better in terms of ESG scores because they have more resources, governance structures, and transparency. However, the relationship between ESG performance and financial returns is more pronounced in larger companies. Large firms may also be able to exert stronger regulatory pressure. Related contributions addressing the size factor in the ESG literature include [2,20–22].

Conversely, some argue that CSR activities may create managerial agency problems. Corporate managers might pursue activities that maximize personal utility at the expense of shareholder welfare, as analyzed in [6].This causality can also reverse: higher-value firms and better financial performance may lead to higher ESG performance, as larger firms are better equipped to allocate resources to ESG activities. Both causality directions predict a positive association between ESG performance and shareholder wealth. The data supports this association, with higher CSR performance often seen in firms with greater resources and in developed countries. Identifying the direction of causality remains an important issue in academia. A related strand of research suggests that companies that offer high-quality environmental and social disclosures can reduce informational asymmetry. Effective corporate ESG reporting is recognized as a key tool for enhancing corporate reputation, see [23] The overall conclusion is that there are two directions of causality within the ESG-CFP link and that both effects relationships predict a positive association between ESG performance and shareholder wealth.

The ESG-CFP nexus has been applied in a number of meta analysis. [2], examine over 2,000 empirical studies across management, accounting, finance, and economics are reviewed. Their meta-analysis concludes that approximately 90% of studies find a non-negative ESG-CFP (corporate financial performance) relationship. The note that the studies in finance addressing this link apply various techniques to establish the relationship between firm performance and ESG commitment. Performance and value are assessed in terms of short- or long-term stock returns or Tobin's Q.

Table 2, presents performance metrics and their relationship with environmental, social and governance (ESG) scores or corporate social responsibility (CSR) data in various countries and time periods. Reported results show that there is a large variation in terms of geographical scope and time periods, as well as performance measures used in the analysis. Most importantly, the sign of the ESG/CSR-CFP nexus varies. In many cases, a positive relationship was found between ESG/CSR performance and financial performance metrics, including for companies in the USA, China, and Europe. A negative relationship was noted in a few instances, like for Tobin's Q in the USA in 2007. Some studies observed mixed relationships (both positive and negative), such as for excess returns in Europe or short-term returns in the USA. No relationship was found in certain cases, such as revenue growth in the USA (2003-2009).

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Table 2. Performance Metrics, Value, and ESG/CSR

Sample	Sample Period	Performance Metric	Ind/Dependent	Sign	Citation
CHINA	2009-2021	Value Added of Assets	Independent	+	Yuer et al. 2024
CHINA	2017-2021	ROA, ROE, TobinÂ´s Q	Dependent	+	Zhao et al. 2023
EUROPE	2005-2019	Excess returns	Independent	+/-	Bermejo et al. 2021
USA	1991-2011	Stock returns	Dependent	+	Chang et al. 2019
USA	2003-2015	TobinÂ´s Q	Dependent	+	Alburquerque et al. 2019
USA	1991-2013	Firm Value	Independent	+	Meng 2019
USA	2007	TobinÂ´s Q	Dependent	-	Buchanan et al. 2018
USA/Europe	2007-2015	Long-run returns	Dependent	+	Glosner 2017
USA	2001-2007	Short run returns	Dependent	+/-	Kruger 2015
USA	2002-2011	Portfolio returns	Dependent	+/-	Halbritter 2015
USA	1993-2010	Stock portfolio returns	Dependent	+	Eccles 2014
USA	2003-2009	Revenue Growth	Dependent	0	Di Giuli and Kostovetsky 2014
USA	2003-2009	ROA	Dependent	-	Di Giuli and Kostovetsky 2014
USA	1991-1995/1996-2000/2001-2008	Financial Constraints	Independent	-	Hong et al 2012
USA	1984-2009	Long-run returns	Dependent	+	Edmans 2011
USA	1998-2002	DJSI	Dependent	+	Lee Faff 2009

This table summarizes results proposed to relate to ESG/CSR in the academic literature on value and firm performance. For each paper cited, we report the variable of interest, whether it is an independent or dependent variable. Sign indicates the direction of the relationship between ESG/CSR and the performance metric. 0 indicates no significant relation was found. Both +/- means relationships in both directions have been found among different ESG metrics.

Studies such as [5] contribute to the literature using three different sources of ESG ratings. Bloomberg, Asset4, Reuters, and KLD. They highlight that results can be biased depending on the underlying rating approach. In addition, they highlight the limitations arising from the use of short periods in other studies, arguing that cross-sectional regressions provide better insight into ESG levels and their effect on stock returns. Using a sample period from 1990 to 2011, they combine and normalize ESG metrics from the three providers. They employ a time-series portfolio approach to evaluate the performance of the ESG ratings, applying the [24] four-factor model. To gain further insight, they used a cross-sectional regression analysis, following the panel-based strategy of [25], to analyze the direct impact of ESG values on returns. Their findings show no significant return differences between firms with high and low ESG ratings. Cross-section regressions reveal an ambiguous influence of ESG variables depending on the rating provider.

[26] utilize KLD ratings at the firm level and find no evidence of companies recovering ESG expenditures through sales. They report a negative relationship between increases in ESG ratings and future stock returns, as well as declines in firm ROA. This implies that sustainability commitment benefits are achieved at the expense of firm value. Their sample includes a panel of the Russell 3000 index from 2003 to 2009. They calculate KLD scores by summing up 56 categories for each firm-year observation and regressing stock returns on the prior year's levels of KLD strengths, concerns, and overall ratings. Their results indicate that KLD scores have no effect on stock returns. They conclude that expanding sustainability commitments leads to long-term declines in financial performance and ROA, interpreting stock declines as delayed market reactions to ESG policies due to the investors' learning process.

Conversely, studies like [14] report a significantly positive relationship between ESG ratings and financial performance. They find that firms with high product differentiation benefit from favorable sustainability policies. [27] take an alternative approach by examining the relationship between firm cash holdings and CSR performance. Using KLD ratings for US corporations from 1991 to 2011, they regress firm cash holdings on CSR performance and estimate the effect on cash value. Their findings indicate that an additional dollar increase in cash has a more significant impact on firm value for higher ESG-rated companies, suggesting that sustainability commitments enhance firm value.

Additional studies support the positive effects of CSR/ESG on financial performance. [10] uses a 14-year period from 1984 to 2009 and demonstrate a positive correlation between employee satisfaction and ESG performance, indicating that sustainability policies create firm value. Similarly, [28] analyze US banks and concludes that poor performance is positively related to the overall ESG index (using KLD ratings), suggesting that CSR activities are rewarded with improved financial performance.

Several studies focus on short-term market reactions to ESG events. [29] analyzes stock market reactions to over 2,000 positive and negative sustainability events for US firms using the KLD Socrates

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database. They find significant differences in market responses: investors respond strongly and negatively to adverse events and weakly and negatively to positive events. Adverse reactions are particularly pronounced for information about communities and the environment. The authors estimate a median cost of $76 million for adverse events, indicating substantial expenses associated with corporate irresponsibility. Their results also show that adverse events provide information about legal risks and economic contexts, aligning with the view that unsustainable behavior is costly for shareholders.

[30] contribute to the ESG literature by showing that the CSR value effect varies with institutional ownership levels. Using Bloomberg ESG ratings as a proxy for CSR quality, they examine the impact of CSR on firm value changes during the financial crisis. They find that CSR engagement can negatively affect firm value, particularly during severe agency conflicts. High ESG/CSR investment costs are cited as the reason for more significant value declines among firms with solid sustainability commitments during the crisis.

3.2. The Link Between ESG and Idiosyncratic Risk

ESG characteristics may also affect future cash-flows through variations in idiosyncratic (and downside) risk exposures. Various studies have argued that ESG/CSR can affect a company's risk profile through several channels. These include idiosyncratic risks and more specifically reputational risk, product development risk, and litigation risk.

Table 3, documents the studies that use idiosyncratic risk as the primary research variable.The data reported in column one shows that the literature addressing the ESG/CSR nexus covers different geographic areas and time periods. Column 2 highlights the heterogeneity of sample periods used while column 3 reports the different measures of idiosyncratic risk applied. It demonstrates that there is a large number idiosyncratic risk measures used. This includes Z-scores, implied volatility, residuals from asset pricing models (e.g., FF3, FF4, FF5, Carhart 4-factor) among others. Idiosyncratic risk refers to the pure firm specific measures that the academic literature analyzes when examining the ESG/CSR-performance nexus.[4] The third column explains how the idiosyncratic risk variable is measured and defined in relation to ESG/CSR. The reported results indicate that companies with high ESG ratings have historically shown lower idiosyncratic volatility and better management of company-specific risks.

The reported results indicate that multiple studies find a positive relationship, showing that ESG/CSR factors are linked to lower idiosyncratic risk. This positive correlation is seen in regions like the USA (e.g., for tobin's Q and firm Value), Europe (excess returns), and Australia (cost of capital). In many cases, studies find a negative relationship between ESG/CSR and idiosyncratic risk. For example, residuals from asset pricing models (FF3, FF4, FF5) show negative correlations, particularly in regions like China, the USA, and the rest of the world. Other research find a mixed relationship (both positive and negative results depending on the specific ESG metric), such as in Taiwan (Z-score) and the USA (options implied volatility). The study with respect to the UK (2002-2011) finds no significant relation between ESG and idiosyncratic risk using Carhart model residuals. The table also indicates that while most research considers idiosyncratic risk as the dependent variable, examining its relationship with ESG/CSR factors, some analyses use ESG/CSR metrics as independent variables, assessing their impact on idiosyncratic risk.

[4] Note that there are some instances in which the ESG and CSR measures have been used as a proxy for idiosyncratic risk

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Table 3. The Link Between Idiosyncratic Risk and ESG/CSR

Sample	Sample Period	Idiosyncratic Risk	Ind/Dependent	Sign	Citation
Taiwan	2007-2022	Z-score elaboration	Dependent	+/-	Liu 2024
USA	2005-2020	Options Implied Volatility	Dependent	+/-	Sautner 2023
USA	1991-2018	Residuals of 4-factor Carhart model	Dependent	-	Horn 2023
China	2012-2022	FF3, FF4, FF5 residuals	Independent	-	D Liu, et al. 2023
USA	2006-2018	Vine-Risk measures	Independent	+	Bax et al. 2023
Europe	2002-2015	Excess Returns	Independent	+	Jarjir et al. 2022
World	2011-2020	ESG Indices	Independent	-	Jin 2022
China	2006-2019	CSR	Dependent	-	He et al. 2022
USA	2002-2018	FF3 residuals	Dependent	-	Reber 2022
Australia(ASX)	2007-2017	Cost of capital/FF3 residuals	Dependent	-	Gholami 2022
USA IPOS	2002-2018	FF3 residuals	Dependent	-	Gold 2021
Malaysia	2005-2018	Cost of capital/FF3 residuals	Dependent	-	Wong 2021
China	2011-2017	FF3 residuals	Dependent	-	Xiaoran Kong, et al. 2020
USA	2003-2015	Tobin´s Q	Dependent	+	Alburquerque et al 2019
Spain	2006-2011	Corporate reputation	Dependent	+	Odriozola 2017
Europe	2002-2014	Residuals 4-factor Carhart Model	Dependent	-	Sassen 2016
Poland	2012-2013	Portfolio approach	Dependent		Cherwinska 2015
USA	2003-2015	Tobins Q/Firm Value	Dependent	+	Albuquerque et al. 2018
USA	1992-2005/2006-2010	Deterministic estimation	Dependent	-	Becchetti 2015
USA	2007-2012	Portfolio approach	Portfolio approach	-	Clayman 2014
UK	2002-2011	Residuals of 4-factor Carhart model	Independent	0	Humphrey 2012
World	1998-2002	CAPM/Residuals of 6- factor model	Dependent	-	Lee, Faff 2009
Canada	1995-1999	Market Model/Campbell 2001	Portfolio approach	-	Savaria 2004

This table summarizes the findings in the literature relating ESG/CSR and idiosyncratic risk. For each paper cited, we report the sustainability performance and idiosyncratic metric used, as well as whether it is used as independent or dependent variable. Sign indicates the direction of the relationship between ESG/CSR and the risk metric. 0 indicates no significant relation was found. Both +/- means relationships in both directions have been found among different ESG metrics.

[31] focuses on impact stemming from the additional costs and risks resulting from ESG investment. They investigate Taiwan's financial industry from 2007 to 2022 in order to shed light on the link between CSR and capital costs and business risk. They construct a z-score to represent the risk as the degree of bankruptcy and financial distress of the companies. They use earnings, revenue, working capital, earnings before interest, and the market value of the company to construct the z-score, assigning multipliers that are firm-specific. ESG scores for 2017 to 2022 period are used as reference data. They find that the ESG disclosure has a significant negative effect on the z-score at the 1% level, meaning that companies that have implemented ESG strategies exhibit an increased financial risk. Additionally, they find that the environmental and corporate commitment scores have a negative impact on the z-score at the 10% significance level, which means that the higher the score, the greater is the business idiosyncratic risk (the z-score is smaller).

[32] analyze risk premiums in 18 European countries using ESG ratings as a proxy for CSR. The monthly returns for European stocks from June 2002 to May 2015 are extracted from Thomson Reuters. Stocks are classified into three ESG groups (good, bad, neutral), and then linked to financial ratings which is used as the dependent variable. Risk premiums are determined by the excess return of lower-rated firms compared to higher-rated ones. This risk class is labeled as "footprint risk." Reported results reflect that poor ESG practices lead to lower ratings in the medium to long term. They further conclude that companies with low ESG rating yield higher expected returns to compensate for higher risks. This is consistent with the work of [33,34] and [35], which report similar results in a multi sectorial panel analysis of us equity based on carbon emissions and stock returns. This related literature also supports the existence of a carbon premium using carbon emissions firm level data. Note this conjecture is challenged by the work of [36] which shows that green firms offer risk hedging statistical properties and therefore lower returns. [15] discussed how the increased perception of climate risk is reflected in green expected and realized returns.

[37] **i**nvestigate the relationship between ESG criteria and idiosyncratic risk in Australian companies from 2007 to 2017 using Bloomberg data. Their panel regression analysis shows that higher ESG ratings correlate with lower financing costs and reduced idiosyncratic risk. [5] They emphasize that corporate ESG disclosures mitigate firm-specific risks, providing better access to financing. They

[5] Note that the effect on the cost of capital will be analyzed in section 4

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suggest that future research should focus on non-listed small and medium-sized companies while controlling for diverse economic conditions and cultural environments.

[38] report comparable results using USA S&P 500 companies for the period from 2007 to 2012. They provide an in-depth analysis of the documented negative nexus between ESG and volatility. They conducted Chi-square frequency tests and demonstrated that higher CSR-rated companies tend to be in the low-volatility groups, while low ESG-rated firms tended to be in high-volatility groups in a statistically significant manner for all the time periods considered. Both high CSR companies and low volatility resulted in higher stock returns, but the ESG effect is documented to be an independent driver of greater returns. Hence, they argue that there was value-creation in using sustainability criteria in investment decisions.

[39] find that firms with high corporate social performance (CSP) exhibit lower idiosyncratic risk. They calculate idiosyncratic risk using the CAPM and tge six-factor market model, showing that CSP differences explain return variations. High CSP firms achieve lower volatility, and their portfolios yield higher returns. They also emphasize the importance of using the Dow Jones Sustainability Index (DJSI) as a multidimensional sustainability measure. They calculate idiosyncratic risk in two ways. Firstly, they follow [40] and [41] and use the CAPM to estimate the firm's idiosyncratic risk. They also use the 6-Factor Market Model. The idiosyncratic risk is then computed using annual time series regressions, repeating the same process on a five year basis. Similar methods of computing idiosyncratic risk, are also used in [37,39,42,43], and [40]. In their paper, the firm's idiosyncratic risk is taken as the square root of the residual variance captured in each of the models considered. They report that a significant part of the difference in returns between leading CSP and lagging CSP firms or portfolios is explained by differences in idiosyncratic risk.

Earlier studies on idiosyncratic risk and Corporate Social Responsibility performance include [41]. They analyze a relatively small sample of Canadian firms over the 1995-1999 period. They report evidence of significantly lower idiosyncratic risk for higher socially responsible firms when compared with lower socially responsible companies. In a related paper, [44] find evidence of lower risk in leading CSP firms. [45] argue why idiosyncratic risk is relevant when pricing equity. They believe that the size effect found by [46] could be a proxy for the varying idiosyncratic risks of small and large firms. Secondly, they imply that portfolio managers and investors may reasonably seek an additional risk premium for individual company issues perceived to have exceptionally high specific risk. The latter is consistent with the notion of market friction and imperfect capital market assumptions, especially when those are quite evident.

[4] argued in a later paper that ESG information is perceived to provide insights about risk rather than the competitive positioning of the firm (see also [12]). They use a survey approach to first pose the question of what motivates investors to use ESG data. They find that eighty-two percent of the respondents believe that ESG information is important for investment performance. A smaller percentage of the respondents state that such information is considered in the decision making process because it allows accounting for ethical responsibility, with European investors being more likely to regard this as an ethical obligation. Overall, their findings strongly suggest that investors mainly utilize CSP information for financial performance rather than ethical considerations. Secondly, they explore why ESG information is relevant to investment decisions. Respondents suggest that this information is highly relevant for assessing the company's reputational, legal, and regulatory risk. The third reason is that better CSR performance serves as a proxy for management quality. In essence, sustainability reporting offers insights into a company's risks and serves as a corporate accountability tool. Finally, they pinpoint specific ESG issues that are financially significant for investment decisions. Respondents consider anti-corruption policies, board and leadership practices, climate change, and energy and fuel management as the most material ESG factors.

[47] identify issues such as ESG-awareness in estimating the risk premium for firm-specific climate change exposure among S&P 500 stocks from 2005 to 2020. They find positive risk premiums before the global financial crisis of 2008 and an increase afterward. The risk premium is calculated using

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the expected return proxy (MW) introduced by [48] and a different approach (GLB) by [49], which incorporates higher-order moments of stock returns. All estimated parameters include the six-factor [25] model and various firm characteristics. Before 2008, they report a positive risk premium for climate change risk exposures of 1% annually. During the financial crisis, the risk premium declined sharply and became negative. From 2011 to 2014, both premiums increased, ranging between 0.5% and 1% annually. Since 2015, the premiums have reverted to zero. Since 2015, it has reverted to zero again. Additionally, they find that ESG fund flows decrease the risk premium for climate change exposure. This suggests that additional flow information raises stock prices, reducing the conditional risk premium. These findings align with the idiosyncratic risk channel mechanism described by [8], highlighting how better risk management reduces severe incidents and tail risks.

[50] examine the effect of ESG performance on stock idiosyncratic volatility in China using data from listed firms (2012–2022). They find that ESG reduces idiosyncratic volatility by enhancing transparency and enabling better risk management, establishing a causal link between ESG performance and reduced firm-specific risks.

In contrast, [51] notes that firm-specific factors influence idiosyncratic risk and can increase with ESG efforts due to additional restrictions on profit maximization. While ESG initiatives can raise idiosyncratic volatility, they also help mitigate stakeholder conflicts, indicating that firms with high ESG performance are not inherently more risky.

In the literature, the relationship between ESG and idiosyncratic risk remains complex. Positive ESG performance is frequently associated with lower volatility and financing costs, but methodologies and data interpretation variations introduce nuances that warrant further investigation. The overall result of this section is that the idiosyncratic risk dimension of the cash-flow channel documents economically meaningful drivers of the ESG-CFP channel. Specifically, ESG disclosures are linked to lower capital constraints (see [52]) and decreased stock price variation due to enhanced ESG transparency. Moreover, industry-specific classifications of the financial materiality of ESG disclosures highlight their direct relationship with firm value and their predictive ability for future financial performance [53]. ESG information is also associated with lower price synchronicity, as prices reflect more firm-specific information, thereby capturing idiosyncratic risks [54]. Strong ESG commitments generally reduce idiosyncratic risk across various regions and sectors. This effect is particularly pronounced during periods of economic uncertainty, such as the COVID-19 pandemic and the 2008 global financial crisis. It is influenced by firm-specific factors such as CEO power and rating consistency. These findings emphasize the importance of integrating ESG principles into corporate strategies to enhance financial stability and resilience.

Finally, it is through the idiosyncratic risk mechanism of the cash-flow channel that the ESG information is associated with various economically meaningful effects. Specifically, ESG disclosures are associated with lower capital constraints (see [52]), [37], and stock price variation due to ESG disclosure and transparency. Moreover, industry-specific classifications of the financial materiality of ESG disclosure identify ESG information that is linked directly to the value and predictive of the firm's future financial performance [53] and are associated with less price synchronicity when prices move more due to firm-specific information, thus reflecting idiosyncratic risks (see [54]). Strong ESG commitment generally reduces idiosyncratic risk across various regions and sectors.

4. The Link Between ESG and Systematic Risk

The characteristics of ESG influence the systematic risk by affecting the discount factor, as systematic risk is the primary risk incorporated into the required cost of capital of an investor. Firms with strong ESG performance are often perceived as lower-risk investments due to improved governance, regulatory compliance, and stakeholder trust. This can lead to lower equity and debt risk premiums, reducing the firm's cost of capital ([43], [52])

To build a fundamental understanding of how ESG characteristics influence corporate financial profiles, it is important to perceive systematic risk as a risk associated to macroeconomic or market

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risk, changes in regulatory framework, and technological know-how. Furthermore, companies focused on environmental sustainability may experience lower exposure to macroeconomic shocks, climate risks, and social instability, further reducing the cost of capital. As a result, investors may apply a lower discount rate to future earnings, ultimately increasing firm valuation and long-term shareholder value.

For instance, [6] observes that firms with higher ESG ratings may have different exposures to systematic risk due to their resilience during crises and/or the presence of a specific ESG/CSR risk factor. Consistent with this argument, [55] finds that during the global financial crisis of 2008-2009, companies with higher ESG ratings performed better than less socially responsible firms.

[12] investigate the value derived from CSR, focusing on stock market measures that reflect future cash-flow expectations rather than accounting measures. They highlight that the "stickiness" of CSR measures—small or often non-existent changes—can lead to incorrect conclusions about CSR's impact on risk or financial performance. Systematic risk determines the required return rate and capital cost, assuming that firm-specific risk can be fully diversified. Higher systematic risk necessitates higher expected returns to compensate investors. To explore this, [12] compare the cost of capital between "Green" and "Toxic" firms by forming portfolios of these stocks. Using the FF-3 model [56], they provide a richer analysis of systematic risk through size (SMB) and value (HML) factors compared to CAPM. Their findings indicate that CSR strengths ("Greenness") are positively valued across all stakeholders, while CSR concerns ("Toxicity") negatively impact firm value. Notably, only the environmental dimension directly contributes to sustainability performance. They also demonstrate that "Green" firms exhibit greater long-term growth in abnormal earnings across most CSR dimensions, except the employee dimension. Their research concludes that high CSR commitment delivers a competitive advantage, allowing firms to achieve long-term abnormal earnings growth. [37,43] show that ESG investment leads to reduced cost of capital.

The results reported in Table 4 show that there are many studies indicating that better ESG/CSR performance is associated with lower systematic risk, including a number of systematic risk measures such as the CAPM beta value at risk (VaR) or the probability of default. There are, however, a number of studies that find a positive relationship using mainly CAPM betas and stock returns.

Table 4. Systematic Risk and ESG/CSR

Sample	Sample Period	Performance Metric	Ind/Dependent	Sign	Citation
USA	2005-2021	CAPM Beta	Dependent	+/-	Pistolesi et al. 2024
CHINA	2015-2021	CAPM Beta	Dependent	-	Saci et al. 2023
World	2002-2021	Ebitda	Dependent	-	Egorova et al. 2023
World	2010-2021	Probability of default	Dependent	+/-	Anwer et al. 2023
Indonesia	2018-2020	Market Beta	Dependent	+/-	Ekaputra et al. 2023
World	2007-2020	Value At Risk	Dependent	-	Aevoae et al. 2022
USA	2016-2020	PCA	Dependent	-	Eratalay et al. 2022
Europe	2016-2018	Market Value Model	Dependent	+/-	Cerqueti et al. 2021
World	2007-2017	DCF Model	Dependent	-	Giese et al. 2019
USA	2007	Tobin´s Q	Dependent	-	Buchanan et al. 2018
USA	2001-2007	Short run returns	Dependent	+/-	Kruger 2015
USA	1992-2009	Firm Value	Dependent	+	Gregory 2014
USA	1993-2010	Stock portfolio returns	Dependent	+	Eccles 2014
USA	1991-1995/1996-2000/2001-2008	Financial Constraints	Independent	-	Hong et al. 2012
USA	1980-2003	Stock portfolio returns	Dependent	+	Hong et al. 2009

This table summarizes results proposed to relate to ESG/CSR in the academic literature on systematic risk. For each paper cited, we report the variable of interest, whether it is an independent or dependent variable. Sign indicates the direction of the relationship between ESG/CSR and the performance metric. 0 indicates no significant relation was found. Both +/- means relationships in both directions have been found among different ESG metrics.

[8] examine ESG integration as a tool for improving portfolio risk-return profiles. They attribute inconclusive results to differences in underlying ESG data and the lack of standardized methodologies for controlling common factors. Their analysis focuses on three transmission channels: the idiosyncratic risk channel, the discounted cash-flow (DCF) channel, and the valuation channel. As it is the case in the current analysis they capture systematic risk is captured by the cost of capital, while firm-specific risks

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are reflected in the present value of future cash-flows. A strong ESG profile contributes to competitive advantages and profitability, resulting in higher future cash-flows and dividends. Lower idiosyncratic risk arises from better risk management, reducing severe incidents and tail risks. Systematic risk is minimized through lower capital costs, leading to higher valuations. For instance, energy-efficient companies are less vulnerable to shocks, translating to lower beta and required returns under a CAPM framework. [57] highlights two additional factors: socially responsible investors who avoid low-ESG companies and reduced information asymmetry in high-ESG firms due to greater transparency.

[58] analyze the relationship between systematic risk and ESG factors for NYSE-listed companies over 17 years (2005–2021). They find a non-linear, inverted U-shaped relationship between ESG expenditure and systematic risk. Low ESG spending provides flexibility and reduces risk, but higher ESG investments lead to lower systematic risk beyond a certain threshold. This dynamic reflects investor preferences and sticky demand for ESG stock, as identified by [59] and [15]. Their analysis demonstrates that, similar to the DCF model, companies with strong ESG profiles are less susceptible to market shocks, as reflected in a lower market beta factor. They contribute to quantifying a specific threshold beyond which companies can gain competitive advantage against peers by lowering their cost of capital and leading to higher valuations.

Overall, strong ESG performance generally leads to a reduction in systematic risk, especially during periods of economic uncertainty such as the COVID-19 pandemic. These mitigating effects are especially significant in the environmental and governance pillars, underscoring the role of ESG metrics in promoting financial stability within the global economy. ESG practices are particularly pronounced under conditions of economic uncertainty, such as the COVID-19 period and the financial crisis of 2008, see [8,12,58] and are influenced by specific firm conditions, such as CEO power and rating consistency. These findings underscore the importance of integrating ESG principles into corporate strategic plans as tools to improve financial stability and resilience.

5. ESG/CSR Performance and Downside Risk

The cash-flow channel that identifies the ESG-CFP link also addresses the effect of downside risk as an important mechanism when ESG (Environmental, Social, and Governance) factors play a crucial role in mitigating downside risk, which refers to the potential for significant financial losses due to adverse events. Firms with strong ESG performance tend to exhibit lower downside risk through several mechanisms that can be embedded under the cash-flow channel as well as the discount rate or systematic channel. These include i) reputational resilience: strong ESG practices enhance brand reputation and stakeholder trust, making firms less vulnerable to consumer backlash, boycotts, or social controversies that could harm financial performance. ii) Operational stability: Sustainable supply chain management, ethical labor practices, and environmental risk mitigation enable companies to prevent disruptions that could result in expensive operational setbacks. iii) market perception and investor confidence: firms with strong ESG credentials are often viewed as lower-risk investments by institutional investors, which can reduce stock price volatility and downside risk during market downturns. iv) regulatory and legal protection, companies that proactively address ESG concerns are less likely to face fines, lawsuits, or regulatory penalties, reducing unexpected financial shocks. v) crisis resilience: ESG-focused firms tend to demonstrate stronger financial and strategic resilience during economic crises, as they are better prepared to manage long-term risks related to climate change, social unrest, and governance failures.

The literature that specifically investigates the relationship between ESG/CSR performance and downside risk is noteworthy. Important contributions include [14,55,60–62].

[63] introduces an innovative approach to studying tail risk by examining downside, extreme systemic, and spillover risks in ESG factors within the health and financial sectors in the USA, China, Europe, and the UK using ETFs. Motivated by the climate change crisis, they focus on the health and financial sectors due to their unique role during the COVID-19 pandemic and their interconnection with ESG investments. Using daily ESG ETF data from Bloomberg, they identify the top 10 ESG

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healthcare and financial ETFs by net asset value. Applying extreme value theory, they assess equity tail risk, finding that ESG sectors exhibit high tail risk during shocks of 25% or 50%. The financial sector shows the highest risk, while the healthcare sector demonstrates the lowest tail quartile risk. The ESG sector remains the riskiest for extreme systemic risk, especially during shocks originating in China. The study also shows that the healthcare and ESG sectors have lower spillover risks than the financial sector.

[64] analyze ESG indices' risk-adjusted performance in developed and emerging markets, such as India, Brazil, and China, using data from the MSCI database for 2017–2022. ARCH and GARCH models are applied to model conditional variance, and the Sortino ratio is calculated to measure downside risk. Findings reveal that ESG returns are highest in the USA (13.69%) and India (13.04%), with lower volatility than diversified markets in most regions, except China. ESG indices generally yield positive rolling returns, with India achieving the highest alpha (4.82%) and China the second highest (1.49%). The sortino ratio exceeds the sharpe ratio for all ESG indices, indicating limited downside risk relative to overall volatility. This is attractive for rational investors seeking minimal downside exposure.

[55] find that firms with high environmental and social ratings achieved significantly higher returns during the 2008–2009 financial crisis. Using MSCI ESG statistics, they observe that socially responsible firms had returns 4–7 percentage points higher than less responsible firms, attributing this to more outstanding social capital. Regression analyses reveal that social capital is at least half as important as liquidity and leverage. Idiosyncratic risk is defined as residual variance from a market model, included as a control variable and results show a significant negative relationship to returns when a positive relationship is present between crisis-period returns and CSR. Their research suggests that CSR activities, and social capital in general, yield higher returns, particularly during periods when trust becomes more crucial, especially due to significant downside risks, as seen during the 2008-2009 global financial crisis.

They also find that excess returns are higher for companies based in regions where people have higher levels of trust. They do not find noticeable difference in stock return performance between high- and low-CSR firms during the recovery period following the crisis. Overall, these findings imply that in periods of greater lack of transparency and information asymmetry, the social capital gained through CSR activities is particularly valuable during times when trust in corporations has diminished. In contrast, during more stable periods, the benefits of social capital are already reflected in a firm's stock price. The absence of a reversal in returns after the crisis suggests that trustworthiness has remained important, which aligns with the cash-flow mechanism, reputational resilience and operational stability.

[61] indicates that ESG engagement contributes to a reduction in downside risks, although the extent of this impact varies by the nature of the engagement. Notably, the most substantial risk mitigation is observed in environmental areas such as climate change, whereas engagements deemed unsuccessful exhibit no statistically significant effects. Using the FTSE All-World Index, they find that downside risk decreases significantly after successful ESG engagements, providing evidence that ESG initiatives can create long-term value.

The work of[65] investigates risk reduction and window-dressing hypotheses using a sample of U.S. firms in controversial industries from 1991–2010. They find that CSR commitment inversely relates to firm risk, with higher CSR scores associated with lower long-term risk. The study emphasizes that CSR involvement can improve a company's image and corporate reputation while reducing downside risk.

Table 5 reports a summary of recent specific studies that address ESG performance and downside risks. The studies cover diverse geographical regions, including the USA, Europe, China, Korea, and heterogeneous samples and measures of downside risk.

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Table 5. ESG/CSR Perfomance and downside risk

Sample	Sample Period	Downside Risk Metric	Ind/dependent	Sign	citation
USA, UK, China, Europe	1999-2022	EVA Tail-Risk	Dependent	+	Chaundhary 2023
USA, Germany, Japan, India, Brasil China	2017-2022	Sortino Ratio	Independent	-	Gupta 2023
USA, Canada, Mexico	2011-2020	Ohlson O-score	Dependent	-	Lisin 2022
China	2010-2020	Lower order returns	Dependent	-	Feng 2022
World	2018-2020	VaR	Dependent	+	Loof 2022
Korea	2011-2019	Credit Risk	Dependent	+/-	Kim et al 2021
USA	2009-2020	ESG risk rating	Dependent	-	Xiong, J. X. 2021
USA	2009-2016	Climate Risk Tail	Dependent	-	Emirhan Ilhan et al 2020
China	2015-2020	Stock-return volatility	Dependent	-	Broadstock et al 2020
Korea	2010-2015	Credit Ratings/Bond Returns	Independent	+/-	Jang et al 2020
World	2005-2018	Negative Returns	Dependent	-	Hoepner et al 2018
USA	2008-2009	Idiosyncratic downside risk	Independent	-	Lins et al 2017
USA	1995-2009	Conditional skewness	Dependent	-	Kim et al 2014

This table summarizes the results proposed to relate to ESG/CSR in the academic literature on firm-specific downside risk. For each paper cited, we report the variable of interest, whether it is an independent or dependent variable. Sign indicates the direction of the relationship between ESG/CSR and the performance metric. 0 indicates no significant relation was found. Both +/- means relationships in both directions have been found among different ESG metrics.

The table compiles key findings from various academic studies that examine the relationship between Environmental, Social, and Governance (ESG) or Corporate Social Responsibility (CSR) performance and downside risk. Most studies indicate a negative relationship between ESG/CSR and downside risk. This suggests that firms with stronger ESG/CSR performance generally experience a lower downside risk.

For example, in the USA (2008-2009), idiosyncratic downside risk decreases with better ESG performance, according to [55] . In the USA (2009-2020), the ESG risk rating has a negative impact on downside risk ([66] . In China (2015-2020), firms with strong ESG/CSR practices experience lower stock-return volatility, as reported by[67].

In some cases, ESG/CSR appears to be linked to higher downside risk. For instance, a global study (2018-2020) found that Value at Risk (VaR) increases with ESG/CSR involvement, as reported by [68]. Similarly, a study covering the USA, UK, China, and Europe (1999-2022) shows that EVA Tail-Risk is positively associated with ESG, according to [63]. These findings suggest that while ESG may offer benefits, certain aspects of ESG engagement could expose firms to additional risks, potentially due to higher costs or market perceptions.

Several studies report mixed effects, where ESG/CSR may either reduce or increase downside risk depending on the specific ESG metric or context. For example, in Korea (2011-2019), findings on credit risk were mixed, as observed by [69] Additionally, in Korea (2010-2015), credit ratings and bond returns showed both positive and negative associations with ESG, as noted by Jang, Kang, Lee, and Bae (2020). This variation indicates that the impact of ESG on risk is context-dependent and may vary by industry, country, or measurement approach.

The overall conclusion of this section is that the reported evidence highlights a growing interest in integrating ESG principles into corporate strategies and investment decisions. Adopting ESG practices can enhance financial performance while also attracting investments with reduced downside risk. When evaluating portfolio performance, investors pay close attention to downside risks, as potential losses significantly influence their decision-making. Ultimately, investors seek to maximize returns by capitalizing on upward market volatility while minimizing losses during stock price declines.

6. Gaps in Current Literature

In this section, we highlight key gaps in the literature on the relationship between ESG factors and financial performance and provide some concluding remarks.

Within the DCF model framework, systematic risk influences a firm's cost of capital through the discount factor, while idiosyncratic risk directly affects future cash-flows, profitability, and tail risk. ESG factors play a crucial role in shaping a firm's financial profile, affecting both systematic and

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idiosyncratic risk. Proponents of the DCF model argue that firms with strong ESG performance are more resilient to market shocks, more competitive, and less exposed to tail risk. Reported summary results show that some studies indicate mixed findings depending on the ESG metric being considered, highlighting the complexity of the relationship between ESG and systematic risk.

Many studies focus on a single ESG rating agency, with limited attention to the individual pillars that constitute the overall ESG score. Socially responsible investment (SRI) practices primarily use negative screening, excluding firms involved in industries such as tobacco, weapons, gambling, nuclear power, and controversial financial or technology sectors. However, these broad exclusions fail to account for a firm's ability to manage risks within its specific industry. This omission of individual ESG pillars in investment screening presents a significant gap.

Another major gap is the lack of a standardized ESG classification system. Current ESG ratings use different methodologies, reducing comparability, timeliness, and reliability in financial decision-making. Without uniform reporting standards, ESG disclosures remain inconsistent across firms, countries, and economic contexts. This inconsistency distorts transparency, misguides investors, and may create biases against firms with low ESG ratings. Risk-averse investors and socially conscious portfolio managers often avoid lower ESG-rated firms due to asymmetric information, despite these firms potentially offering sound financial fundamentals. The lack of transparency penalizes lower-rated firms while benefiting those with greater disclosure, reinforcing ESG-related valuation disparities. Developing new ESG proxies and refining rating methodologies would improve the accuracy of ESG assessments. A unified ESG metric would enhance the transparency and applicability of active ESG investment strategies over time, encouraging firms to disclose ESG information more consistently and comprehensively.

Establishing the direction of causality within the ESG-CFP is a challenge. The size factor is important in determining ESG performance. Bigger firms can invest higher number of resources in sustainability related goals.

Measuring idiosyncratic risk also presents challenges. The Carhart four-factor model, which defines firm-specific risk as the variance of residuals, may overlook other factors influencing firm value. A comprehensive methodology or theoretical framework explaining ESG risk dynamics over short- and long-term horizons is still lacking.

Within the systematic risk transmission channel, the governance pillar plays a pivotal role in improving CEO transparency, decision-making efficiency, and internal corporate strategies. Strong governance enhances information symmetry, stabilizes stock price volatility, lowers financing costs, and strengthens long-term financial performance. Studies show that financial and non-financial firms differ significantly in their ESG disclosure strategies. Non-financial institutions, particularly banks, have made limited ESG investments, despite evidence suggesting that firms with robust governance structures exhibit greater financial stability, lower bankruptcy risk, and better decision-making processes.

The current review of the literature demonstrates that most studies indicate a positive correlation between ESG/CSR efforts and financial performance metrics. However there are a few studies show negative or mixed results, particularly in the context of specific time periods (e.g., 2007 USA study with Tobin's Q). Research results also show that the majority of the studies focus on long-run performance or stock returns, with varying results across countries and sectors. The analysis of the ESG/CSR-CFP nexus shows evidence that the relationship between ESG/CSR and idiosyncratic risk varies across regions, time periods, and specific metrics used. Moreover, while most of the studies report a negative relationship between ESG/CSR and idiosyncratic risk, suggesting that better ESG/CSR performance could potentially reduce the firm-specific risk

The review underscores the interdependence of CSR and ESG investments. Companies integrating ESG principles into corporate strategy enhance brand image, build customer loyalty, and drive sustainable long-term financial growth. The environmental pillar, for instance, influences corporate valuation by shaping a firm's ecological commitment, social reputation, and brand image. Firms

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actively engaged in environmental initiatives improve their public perception, increase customer trust, and strengthen long-term financial stability.

The social pillar reflects a firm's ability to gain societal trust and establish itself as a responsible corporate entity. ESG investments not only generate long-term economic benefits, but also improve operational efficiency by fostering strong relationships with stakeholders. Positive ESG performance attracts media attention, increases firm visibility, and enhances supply chain efficiency.

Our review suggests several avenues for future research, particularly on the long-term value implications of ESG investments. Existing studies fail to fully quantify ESG-related intangible assets - such as reputation, goodwill, and employee satisfaction - and their impact on financial performance. Current ESG valuation models inadequately incorporate these intangibles, leading to potential mispricing and misinterpretation of ESG benefits. Future research should develop a transmission mechanism linking intangible ESG value to stock prices.

The relationship between ESG performance and financial returns remains complex and inconsistent across sectors and regions. While some studies indicate that investors accurately price ESG benefits in the short run, others suggest that CSR mispricing leads to long-term under-performance. The absence of a standardized ESG rating methodology exacerbates this inconsistency. Further research is needed to reconcile diverging findings, refine ESG investment models, and improve measurement accuracy.

Transparency in ESG policies is increasingly linked to profitability, earnings stability, and dividend yields, validating the tail-risk and cash-flow channels. The academic literature correlates higher ESG scores with lower financial volatility as a natural outcome of better risk management. Companies with strong ESG metrics effectively mitigate market shocks and maintain resilience, particularly during economic crises such as the 2008 financial crash and the COVID-19 pandemic.

Understanding the tail-risk channel, which examines stock price crash risk and downside asymmetry, is essential for investment decisions and long-term risk management. However, there is no clear consensus on whether ESG consistently improves financial performance or mitigates firm-specific risks. ESG/CSR generally reduces downside risk, as evidenced by most studies finding a negative relationship. Some studies show a positive or mixed relationship, suggesting that ESG may sometimes increase risk depending on context. The impact of ESG on risk varies by country, time period, and measurement method. More recent studies focus on ESG-specific risk measures, reflecting a growing interest in ESG integration into financial risk models. Research in this area remains fragmented, requiring a more systematic exploration of ESG-related risk transmission mechanisms.

The underlined ESG principles do therefore offer a promising pathway to align corporate strategies with sustainability goals. Addressing gaps in existing research and standardizing ESG practices will be essential to unlocking their full potential, enhancing corporate value, attracting sustainable investments, and mitigating firm-specific risks.

7. Summary Conclusions

This review contributes to the literature by affirming a positive relationship between ESG performance and corporate financial outcomes, highlighting the broader role of ESG as a catalyst for sustainable development. By mapping the transmission mechanisms identified in the Discounted cash-flow (DCF) framework to specific United Nations Sustainable Development Goals (SDGs), we underscore the potential of ESG integration to advance global sustainability objectives. Mechanisms such as enhanced cash-flow, reduced idiosyncratic and downside risk, and lower cost of capital are not only financially material but also directly support goals including SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action). This alignment reinforces the notion that ESG is more than a financial signal—it is a strategic lever for corporate contributions to long-term environmental, social, and economic resilience. The reported results also demonstrate how ESG investments encourage more sustainable business practices, promote green investment, and align corporate behavior with global sustainability targets.

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