

DNB Working Paper

No 867/August 2026

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DeNederlandscheBank

EUROSYSTEEM

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* Views expressed are those of the author and do not necessarily reflect official positions of De Nederlandsche Bank.

Working Paper No. 867

August 2026

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A review of allocation and cost of capital

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28th August 2026

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[‡]I thank Iman van Lelyveld, Eelke de Jong, Maurice Bun, and Norma Fötsch for their valuable comments and suggestions. The views expressed here are solely those of the author and do not in any way represent the views of De Nederlandsche Bank (DNB). Any mistakes are my own.

Abstract The EU has introduced an extensive ESG disclosure regime aimed at redirecting private capital to support the transition to a sustainable economy. Yet, it remains unclear whether these disclosure obligations lead to measurable shifts in the allocation and cost of capital to green firms or investments. This review aims to address this gap by developing a conceptual framework that identifies the mechanisms through which both voluntary and mandatory disclosures may influence the allocation and cost of private capital, and by systematically mapping the emerging empirical evidence against these channels. It draws on 99 publications from three academic databases (Scopus, Web of Science, EconLit) and EU institutions, published between 2010 and 2025. The review shows that the evidence base remains emerging and fragmented, but generally points to a positive association between ESG disclosure or performance and access to finance and more favourable funding conditions. At the same time, capital markets seem to anticipate regulatory compliance costs and risks, which can increase uncertainty, and in some settings, adversely affect firms with potential implications for market functioning and capital allocation and pricing. The review further highlights implications for academics and regulators. For academics, it identifies several gaps and limitations suggests avenues for future research. For regulators, it provides cautious support for disclosure regulation, while underscoring the need for credible, usable and proportionate requirements.

Keywords: Regulation, Disclosure, Environmental, social and governance (ESG), capital allocation, cost of capital, Review

JEL codes: G11, G12, G14, G38, M14, M41, M48

1 Introduction

Since 2018, the European Union (EU) has developed a comprehensive sustainable finance framework centred on enhancing transparency through environmental, social, and governance (ESG) disclosure legislation. Its objective is to mobilise private capital and improve funding conditions for sustainable firms and projects (European Commission, 2018; European Commission, 2021). Achieving the EU's goal of climate neutrality by 2050 will require a substantial reallocation of private capital towards such projects. With public budgets constrained, the success of the green transition therefore depends critically on financial markets' ability to mobilise and allocate private funds effectively. Regulators therefore increasingly rely on disclosure-based regulation as a key instrument to influence capital market outcomes.

Yet it remains unclear whether ESG disclosure requirements lead to the intended changes in the allocation and cost of capital for green investments. The policy rationale is simple: enhanced transparency may reduce information asymmetries and enable investors to better assess sustainability-related risks and opportunities. This, in turn, could shift capital towards greener firms or projects and lower their financing costs. However, whether ESG disclosures are sufficiently decision-relevant to affect investment behaviour and capital market outcomes remains an open question.

First, while the broader disclosure literature suggests that improved transparency can influence the allocation and pricing of capital, much of this evidence is based on financial disclosure. The mechanisms linking financial disclosure to capital market outcomes may not extend directly to ESG reporting (H. Christensen, L. Hail and C. Leuz, 2021). ESG disclosures differ fundamentally from traditional financial disclosures: whereas financial reporting provides investors with firm-performance metrics directly relevant to investment decisions, ESG reporting covers a wider set of issues that may not affect such decisions to the same extent. In particular, ESG reporting may reflect either “single materiality”, concerning the financial relevance of ESG factors, or “double materiality”, which also captures firms' environmental and social impacts (Shami, 2023; Zukas, 2023). Double materiality disclosures therefore often concern externalities and long-term effects whose costs and benefits may extend beyond investors' time horizons and accrue to other stakeholders (Hardin, 1968; Carney, 2015; Schoenmaker and Schramade, 2018). Consequently, it is not self-evident that the mechanisms linking financial disclosure to capital allocation and pricing apply to ESG disclosure with the same direction or magnitude.

Second, most empirical research to date examines voluntary ESG disclosures (H. Christensen, L. Hail and C. Leuz, 2021; Krueger et al., 2024), and its findings may not generalise readily to mandatory regimes. In voluntary settings, firms choose whether to disclose, and stronger ESG performers are more likely to report and provide higher-quality information, complicating inference about disclosure effects on market outcomes (H. Christensen, L. Hail and C. Leuz, 2021). Mandatory regimes broaden the reporting population and may partly mitigate this self-selection bias. At the same time, they may also induce weaker ESG performers to rely on “boilerplate” language or “greenwashing” (H. Christensen, L. Hail and C. Leuz, 2021; Gorovaia and Makrominas, 2025), thereby limiting the usefulness of disclosed information for investors. Consequently, evidence from voluntary-disclosure settings may not translate directly to mandatory disclosure regimes.

Third, a large share of ESG disclosure research draws on voluntary disclosure settings outside the EU, particularly the United States (US) (McGee et al., 2025; Rani et al., 2025; Martinez-Meyers, Ferrero-Ferrero and Muñoz-Torres, 2024). Differences in institutional design, legal frameworks, financial market structures, and cultural characteristics may shape the relation between ESG disclosure and capital market

outcomes, limiting the extent to which US findings carry over to the EU. As a frontrunner in adopting a comprehensive and legally binding multilateral ESG disclosure framework (Krueger et al., 2024), the EU provides a particularly informative setting for studying the effects of mandatory ESG disclosures on capital allocation and the cost of capital.

This review seeks to contribute to addressing the knowledge gap on how ESG disclosures relate to capital market outcomes in the EU by developing a conceptual framework that identifies the mechanisms through which both voluntary and mandatory disclosures may influence the allocation and cost of private capital for green investments, and by systematically mapping the emerging empirical evidence against these channels. By mapping the evidence against the conceptual framework, the review moves beyond cataloguing recent findings but critically evaluates whether the evidence supports the intended transmission channels of EU sustainable finance legislation. In doing so, the study exposes important limitations in the current evidence base and provides avenues for future research. It also outlines the implications for ongoing policy debates, particularly in light of recent recalibrations of the EU sustainable finance framework. The review draws on literature sourced from three academic databases and grey literature from the European Central bank and the European Supervisory Authorities. This study relates closely to H. Christensen, L. Hail and C. Leuz (2021), who provide an economic analysis and narrative review of mandatory ESG reporting, and discuss implications in the US context.

The remaining sections are organised as follows. Section 2 presents the methodology; Section 3 introduces the conceptual framework for the mechanisms through which ESG disclosures relate to allocation and cost of capital; Section 4 maps the empirical evidence and discusses whether the evidence supports the intended transmission channels of EU sustainable finance legislation; Section 5 identifies gaps and suggests avenues for future research; Section 6 provides policy implications and Section 7 concludes.

2 Methodology

To address the research question how ESG disclosures affect the allocation and cost of private capital for green investments in the EU, this review adopts a systematic approach inspired by the “guidance on methods used in Cochrane rapid reviews of effectiveness” (Garritty et al., 2024) which is designed to be both methodologically rigorous and timely in view of ongoing policy discourse on the rapidly evolving EU sustainable finance framework. The process for identifying relevant literature comprised four steps: pilot search, identification of relevant academic and grey literature, screening, and complementary search on mechanisms.¹²

First, a pilot search was conducted to develop and refine the search query. This preliminary exploration provided an overview of the relevant literature and informed the final search terms. The final search query consisted of three building blocks, including search terms relating to the population under study – the

¹These steps were conducted in accordance with the Journal’s guidelines for review articles. Further methodological details are provided in the online supplementary material, including the record identification and selection process following the PRISMA protocol (PRISMA Statement, 2020; Moher et al., 2015; Page, McKenzie and Bossuyt, 2021). The supplementary material also reports the search queries used for Scopus, Web of Science, and EconLit, and includes supporting tables summarising the literature underpinning this review. The data supporting the review consist of bibliographic records, screening decisions, and data extraction documentation derived from published studies. Record-level documentation of the screening and data extraction process is available from the corresponding author upon reasonable request where legally permissible, subject to applicable access, licensing, copyright and redistribution restrictions relating to the underlying source materials.

²I thank Norma Fötsch, information specialist at Radboud Universiteit Nijmegen, for critically reviewing the search strategy and search query and providing valuable feedback.

EU, euro area, and individual EU countries; the intervention – various terms relating to voluntary and mandatory ESG disclosures; and outcomes – various key terms capturing capital allocation and cost of capital.

Second, the search query was applied to identify relevant records across three academic databases, Scopus, Web of Science and EconLit. The former two were chosen for their broad, multidisciplinary coverage; the latter constitutes an authoritative source for economics and finance literature. Four inclusion criteria were applied. First, only studies published between 2010 and 2025 were included. The motivation for this temporal restriction is twofold: this time frame corresponds to the evolution of the EU’ sustainable finance framework, and the majority of ESG-related studies have been published within this time span. Second, only English-language studies were included. Third, only peer-reviewed or review articles were considered. Fourth, the search was confined to literature published in the field of economics and finance. After this first identification stage, only studies that met the highest Scopus Journal Rank (SCImago Q1) and a high ABDC rating (A*, A, or B) were retrieved for further screening.

In addition, grey literature from the European Central Bank and the European Supervisory authorities was considered. Given their mandate, these institutions are highly likely to have produced analytical work relevant to the research questions. In addition, they have access to proprietary supervisory data which can meaningfully complement academic research. Within each of these institution’s websites, publication repositories were searched using keywords including “sustainable finance”, “climate”, or “green”. Non-analytical or predominantly opinion based materials were excluded.

Third, the retrieved records were manually screened for relevance in a two-stage process comprising sequential title-abstract screening followed by full-text screening. The aim was to identify which of the retrieved studies empirically assessed the relation between voluntary or mandatory ESG disclosures and the allocation or cost of capital in Europe. The resulting studies were assessed for eligibility using a small set of tailored quality assessment criteria. Based on this strategy, a total of 99 studies were included, comprising 82 studies from academic databases and 17 from grey literature sources.

Finally, a complementary literature search into the mechanisms governing the relation between (ESG) disclosures and the allocation and cost of capital was conducted. This search was guided by the theories most frequently referenced in the included empirical studies.

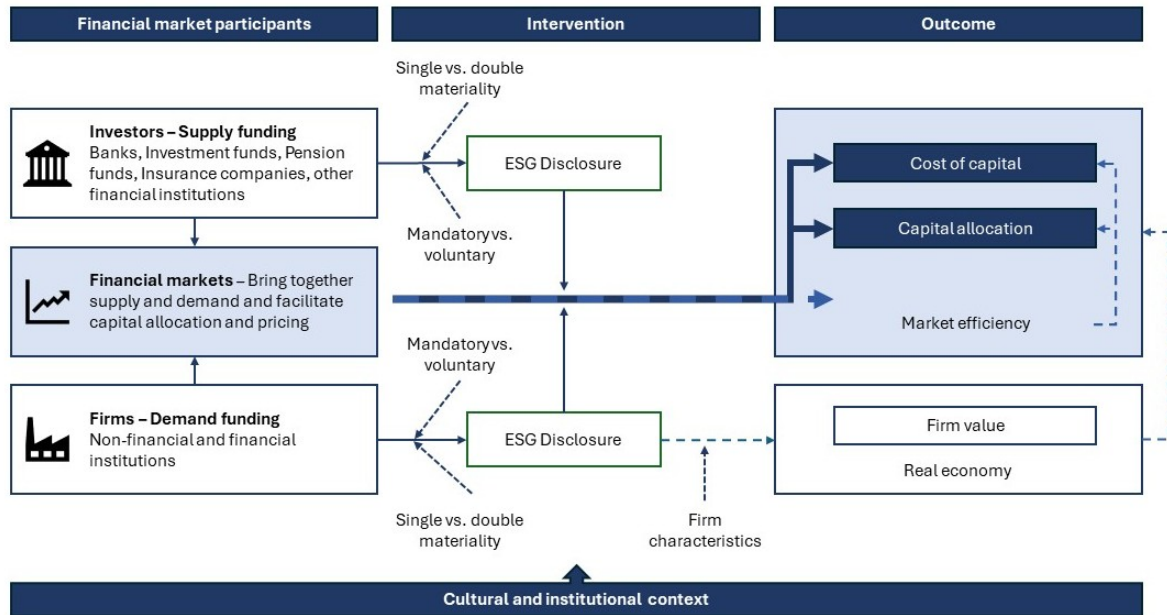
3 Mechanisms linking ESG disclosures to allocation and cost of capital

ESG disclosures may affect the allocation and cost of capital for green firms or investments through several mechanisms, which Figure 1 captures schematically.

3.1 Direct information channels

Like financial disclosures, ESG disclosures may reveal information about a firm’s risks and cash flows, which investors factor into their decisions. If ESG disclosures help investors better assess how a firm’s cash flow co-moves with the overall market, then standard neoclassical asset pricing theory suggests that required returns fall (rise), and capital shifts toward (away from) firms whose perceived market co-movement is revised downward (upward) (Sharpe, 1964; Lintner, 1965; Fama and French, 1993; Cai, 2023). In addition, disclosures that convey new and relevant information at the aggregate level may alter the market risk premium, thereby influencing financing costs economy-wide.

Figure 1: Mechanisms linking ESG disclosure with allocation and cost of capital



Note: This figure shows the conceptual framework used in this review, depicting the mechanisms that link ESG disclosures with the allocation and cost of capital.

Studies in information economics that formally model disclosures and adopt more realistic assumptions on market structures and behaviours generally confirm this intuition (R. Lambert, Christian Leuz and Robert E. Verrecchia, 2007; Hughes, Jing Liu and Jun Liu, 2007; R. A. Lambert, Christian Leuz and Robert E. Verrecchia, 2012). They imply that if ESG disclosures are decision-relevant, these disclosures may raise or lower the cost of capital depending on whether the information amplifies or reduces investors' disagreement (Bloomfield and Fischer, 2011; P. O. Christensen and Qin, 2014). Moreover, such disclosures may further enhance liquidity and improve capital allocation and pricing if they reduce information asymmetries between informed and uninformed investors (Hughes, Jing Liu and Jun Liu, 2007; R. A. Lambert, Christian Leuz and Robert E. Verrecchia, 2012). Finally, in markets characterised by information asymmetries between firms and investors, better-performing firms may be able to attract investors and secure lower cost of capital by voluntarily providing credible ESG disclosures (Jorgensen and Kirschenheiter, 2003; Cheynel, 2013).

3.2 Indirect channels

Indirect information channel through market efficiency Next to these direct channels, ESG disclosures may affect the allocation and cost of capital indirectly through their effect on market efficiency. When ESG disclosures provide credible and easy to interpret decision-relevant signals to investors, they may lower disagreement or uncertainty in the market and improve price discovery (R. Wang et al., 2024; Fuhrmann et al., 2017). In contrast, if ESG disclosures are complex and difficult to interpret, the risk of misvaluation increases (Barka, Hamza and Mrad, 2023; Anselmi and Petrella, 2025). Disagreement among investors could furthermore lead to higher bid-ask spreads (Gibson Brandon, Krueger and Schmidt, 2021), and uncertainty could reduce liquidity (Bachner, 2025; Amihud and Mendelson, 1986). Taken

together, this suggests that if markets are not fully efficient in integrating ESG information, this may lead to higher transaction costs long term for which investors demand to be compensated through higher required returns on capital. Importantly, this mechanism only prevails when markets are persistently inefficient.

Indirect effects through firm value

Stakeholder preferences can influence firm value and capital market outcomes Another indirect pathway linking ESG disclosures to capital market outcomes operates via the preferences of investors and other stakeholders. Firms are embedded in a broader societal and institutional environment and must remain responsive to stakeholder expectations in order to survive and thrive (this is the core premise of Stakeholder (Freeman, 1984), legitimacy (Suchman, 1995), and institutional (DiMaggio and Powell, 1983) theories). Ignoring these expectations can place firms at a competitive disadvantage or even drive them out of the market. When stakeholders place substantial value on corporate sustainability, firms that can credibly communicate strong ESG performance through their disclosures may obtain superior access to capital and more favourable financing terms than firms that are unable to do so (El Ghoul et al., 2011; Dhaliwal et al., 2011).

In addition, firms that can credibly signal their commitment to strong ESG performance, may benefit from a larger customer base (Flammer, 2015), better access to human capital (Turban and Greening, 1997) or suppliers (H. Christensen, L. Hail and C. Leuz, 2021), and have more intangible resources such as goodwill (Barney, 1991). In contrast, firms that fail to meet expectation of stakeholder within the established institutional context, can face higher litigation costs or regulatory fines in the face of controversies, and experience a smaller investor base and higher funding costs (J. Wang, 2026). All these factors influence firm performance or value and might indirectly affect firms' access to and cost of funding.

Firms' response can influence firm value and capital market outcomes Firms need to respond to societal expectations and regulatory requirements concerning sustainability, including by deciding how much to invest in ESG performance and disclosure. While philanthropic motives may play a role, such decisions are likely to be shaped primarily by firms' assessment of the associated costs and benefits. Credible ESG disclosures may improve access to capital and funding conditions through the investor and stakeholder mechanisms described above. In addition, stakeholder pressure and regulation may prompt firms to enhance their ESG performance (H. Christensen, L. Hail and C. Leuz, 2021), which can support long-term firm value (Eccles, Ioannou and George Serafeim, 2014) and affect access to, and the cost of, funding.

At the same time, both ESG disclosure and ESG performance are costly and entail risks. Preparing and disseminating non-financial disclosure reports imposes direct costs on firms (Grewal, Riedl and G. Serafeim, 2019). Disclosures may also create proprietary costs (Robert E Verrecchia, 1983; Dye, 1985; Anne Beyer et al., 2010; Ott, Schiemann and Günther, 2017), as they may reveal information about a firm's business model that could undermine its competitiveness. Firms may also face stakeholder backlash if previously communicated targets are not met (H. Christensen, L. Hail and C. Leuz, 2021). Improving ESG performance can likewise require costly investments, for instance in R&D (Doni and Fiameni, 2024), energy efficiency, or waste management (Grewal, Riedl and G. Serafeim, 2019). In addition, managers may engage in costly self-serving behaviour under the guise of ESG activities and disclosures (Khan et al., 2024; Anwer et al., 2021). Taken together, ESG disclosures may be indirectly linked to capital

allocation and the cost of capital when they influence firm behaviour in ways that affect firm performance and value. Where this occurs, investors may reassess firms' expected cash flows and risks, potentially with implications for required returns and capital allocation.

3.3 Moderating factors

Single versus double materiality ESG disclosures The direct and indirect information channels described in Sections 3.1 and 3.2 are grounded in mechanisms developed for financial disclosure. Because ESG disclosure differs from financial disclosure, their nature may moderate whether and to what extent these mechanisms carry over in direction and strength. This depends on whether, and how, investors incorporate ESG information into decision-making (H. Christensen, L. Hail and C. Leuz, 2021). ESG disclosures can be categorised according to their “materiality”: single materiality concerns how ESG factors affect firm performance (also known as outside-in perspective); double materiality also concerns how firms affect environmental and social outcomes (inside-out perspective).³

Single materiality disclosures arguably have a more direct link to firm value, but neither type necessarily enters investor decision-making. A “tragedy of the commons” may arise when ESG-related costs and benefits fall outside investors' horizons or are borne by others (Hardin, 1968; Schoenmaker and Schramade, 2018). This is especially salient for disclosures concerning environmental factors, given the intergenerational effects of climate change (Carney, 2015). Financial disclosure mechanisms therefore need not carry over with equal strength or direction. Some ESG information may be financially material through cash flow or risk channels; other information may primarily concern societal welfare that is not factored into investment decisions. Nevertheless, growing evidence suggests that many of the financial disclosure mechanisms apply, and that ESG disclosures can lower cost of capital and lead to more efficient capital allocation outcomes (e.g. H. Christensen, L. Hail and C. Leuz, 2021; Pedersen, Fitzgibbons and Pomorski, 2021; Dhaliwal et al., 2011; El Ghouli et al., 2011; Goss and Roberts, 2011).

Voluntary versus mandatory ESG disclosures A second potential moderating factor concerns whether ESG disclosure is voluntary or mandatory, as the disclosure regime may shape both which firms disclose and how disclosure affects capital market outcomes. As H. Christensen, L. Hail and C. Leuz (2021) emphasise, voluntary regimes involve self-selection: firms with stronger ESG performance are more likely to disclose. Empirical associations between ESG disclosure and capital market outcomes may therefore partly capture underlying performance rather than disclosure itself, complicating the identification of disclosure effects (H. Christensen, L. Hail and C. Leuz, 2021; Christian Leuz and Wysocki, 2016). By requiring disclosure from weaker ESG performers as well, mandatory regimes may mitigate this selection problem at least to some degree and may attenuate the positive associations observed in voluntary settings.

Beyond selection, mandatory disclosure may affect the disclosure–capital market relation through competing channels. If mandates improve the reliability and comparability of ESG information while lowering complexity and interpretation costs, they may strengthen the information environment and enhance the efficiency of capital pricing and allocation (the indirect market-efficiency channel). Yet this effect is not automatic. Mandates may also induce firms that would not otherwise disclose to rely on

³The term “double materiality” was first coined by the European Commission (EC) in guidelines (2019/C209/01) supplementing the Non-Financial Reporting Directive (NFRD) (Shami, 2023; Zukas, 2023). In the guidelines, the EC specifies that firms should disclose how their financial performance is affected by climate change, but also how the firm's own operations impact climate

strategic, “boilerplate” or “greenwashed” reporting (see also H. B. Christensen, Luzi Hail and Christian Leuz, 2018), weakening transparency and potential capital-market benefits. Finally, mandatory disclosure may influence firms not only through reporting incentives but also by encouraging improvements in underlying ESG performance. Where such responses affect firm performance and value, they may shape access to capital and funding costs (the indirect firm-value channel). Overall, the capital-market effects of moving from voluntary to mandatory ESG disclosure are theoretically ambiguous and remain empirical.

Other potential moderating factors Several additional factors may moderate the mechanisms linking ESG disclosures to capital allocation and the cost of capital. Because these factors were not explicitly targeted by the review’s search strategy, the discussion is illustrative rather than exhaustive. Cultural and institutional context may condition how ESG information is valued and incorporated into capital allocation decisions and price formation. In this respect, cultural aspects may shape both value relevance for investors and firms’ incentives for selective disclosure (Ziegler, Busch and Hoffmann, 2011; Carbone et al., 2021; Casciello, Maffei and Zampella, 2025; de Vincentiis, 2024), while the legal system and development of financial markets and institutions may further affect the credibility and relevance of disclosed information (Priem and Gabellone, 2024; Mittelbach-Hörmanseder, Hummel and Rammerstorfer, 2021; G. Birindelli, Quas et al., 2025). Firm characteristics may also matter. ESG disclosure (requirements) may affect firms’ performance and value, and subsequently impact their funding conditions differently depending on their size, management and board characteristics (Bruna et al., 2022; Sekerci et al., 2022; Nekhili et al., 2017). This implies that ESG disclosures may not operate uniformly across firms, even within a common cultural and institutional environment. Overall, these factors help explain why the disclosure–capital market relation may show heterogeneity across different contexts.

4 Empirical evidence: ESG disclosures and capital market outcomes

This section maps the empirical evidence on the link between ESG disclosures and the allocation and cost of capital for green investments in the EU to the conceptual framework presented in Section 3.

4.1 Coverage of evidence base

The empirical evidence base (99 studies) exhibits several noteworthy features that should be kept in mind when interpreting the findings, particularly with regard to their generalisability across contexts. Most studies evaluate capital market outcomes from the perspective of financial or non-financial firms that issue ESG disclosures or for which ESG ratings are available. Although these studies cover firms of varying sizes, the evidence base appears to tilt towards larger, more liquid, and publicly traded firms. These studies can be understood as taking a “demand-side” perspective. Another set of studies focuses on financial intermediaries in a “supply-side” role, examining loan provision and pricing by banks or asset allocation by investment funds.⁴ By contrast, the evidence base remains less developed for insurance companies and pension funds, despite their potential relevance for capital market outcomes.

Furthermore, the empirical evidence base is unevenly developed across disclosure regimes. Voluntary disclosure studies are understandably more established, whereas mandatory EU-focused evidence has only recently begun to emerge. However, many studies provide no, or only limited, detail on the specific

⁴Notably, the introduction of the SFDR caused a surge in studies on asset allocation in the investment fund sector.

disclosure regime studied, including whether disclosures are based on single or double materiality, or on the broader institutional context in which disclosures are issued. One important source of this ambiguity is that a large share of the evidence base relies on ESG ratings as proxies for ESG disclosure or performance (56 studies). ESG rating methodologies often draw, at least in part, on firms' self-disclosed information (see e.g. Anselmi and Petrella, 2025), and may therefore capture a broad range of voluntary and mandatory disclosure practices. Studies based on non-financial disclosure or integrated reporting often similarly focus on whether such reports are issued, rather than on their content or the applicable disclosure regime.

4.2 Direct channels

Overall, the literature provides emerging yet fragmented evidence that ESG disclosures and performance are decision-relevant to investors and are linked to capital market outcomes.⁵ Specifically, firms' ESG disclosure and performance generally seem positively associated with access to capital and more favourable funding costs, although results are not unequivocal. At the current juncture, the evidence base is weaker for equity than for debt financing.

Equity financing The identified evidence on the cost of equity is currently sparse and dominated by “secondary market” studies that derive implied cost of equity from factor models (Bachner, 2025; Anselmi and Petrella, 2025) or models that equate the current stock price to the present value of expected future cash flows and solving for discount rates (R. Wang et al., 2024; Orens, Aerts and Cormier, 2010). These studies yield mixed results. Some suggest that ESG disclosures and performance are associated with lower market betas (Khan et al., 2024) lower cost of equity, or (weighted average) cost of capital (R. Wang et al., 2024; Orens, Aerts and Cormier, 2010; Priem and Gabellone, 2024; Khan et al., 2024), and that investors required compensation for greenwashing risk prior to the adoption of the Paris Agreement (Bacher et al., 2025). At the same time, contrasting evidence suggests that ESG factors are not priced as a separate risk factor (Anselmi and Petrella, 2025). With respect to “primary markets”, the limited evidence base suggests that firms with better ESG scores perceive their cost of capital to be lower (Gormsen, Huber and Oh, 2025) and that firms that credibly signal high ESG performance can ask a higher share price at their IPO (Harasheh, 2023). Taken together, the emerging evidence base suggests that equity markets incorporate ESG information and that ESG disclosures and strong ESG performance are associated with lower cost of equity.

Among the studies in scope for this review, only one dealt with the association between ESG disclosures and the amount of capital raised in the primary market, finding that firms that offer ESG disclosures are able to raise larger amounts of capital (Giakoumelou et al., 2024). Other identified studies on the link between ESG disclosures and equity allocation focus predominantly on fund portfolio allocation and investors' portfolio decisions in the equity mutual fund market. This branch of study emerged largely in the context of the SFDR (see Section 4.4). While the reviewed literature hints at a positive association between ESG disclosures access to equity funding at favourable rates, it is important to note that most of the evidence is based on secondary markets, which provide information on implied cost of equity and investor demand or taste for green equity investments. These findings may thus not be fully representative of actual funding conditions faced by firms that want to raise capital in the market.

⁵A first stock-take of the body of identified literature shows that research on allocation (N=26) and cost of capital (N=30) is still scarce, as roughly half of the studies focus on market efficiency (N=26) and firm performance (N=29). The outcomes covered in a single study are not mutually exclusive.

Debt financing The empirical literature on the relationship between ESG disclosure, ESG performance, and the cost of debt is more firmly based on primary markets and can be grouped into three broad strands. The first focuses on green bond pricing by comparing the yields of green and conventional bonds. Evidence is mixed: some studies find no systematic yield differences between the two (Menz, 2010; Balitzky and Reiche, 2023), whereas others document a greenium, suggesting that issuers of green bonds benefit from lower borrowing costs (Zhou et al., 2025; Kanamura, 2025; Pietsch and Salakhova, 2022; Ghitti et al., 2025). One explanation for these divergent findings is that ESG-related risks are increasingly incorporated into conventional credit ratings and risk premia, reducing the incremental information provided by ESG labels (S.-L. Chen, D.-N. Wang and H.-W. Chen, 2025; Ghitti et al., 2025). A second strand examines bank lending. Drawing largely on proprietary supervisory datasets, these studies generally find that firms with stronger ESG performance and disclosure obtain more favourable loan conditions (Altavilla et al., 2024; Eliwa, Aboud and Saleh, 2021; Campanella et al., 2025). However, some research reports no significant differentiation in lending rates based on ESG characteristics (Giannetti et al., 2023; Schreiner and A. Beyer, 2025). Related evidence further suggests that banks with higher ESG scores themselves may benefit from lower funding costs in bond markets (Agnese and Giacomini, 2023). A third strand relies on accounting-based measures of financing costs and generally finds that stronger ESG performance and disclosure are associated with a lower cost of debt (Campanella et al., 2025; Hamrouni, Uyar and Boussaada, 2019). Taken together, while the evidence is not uniform across markets and methodologies, the literature points to a generally favourable relationship between ESG performance and disclosure and firms' debt financing costs.

The literature on credit allocation mainly originates from research conducted by supervisory authorities (Altavilla et al., 2024; Gambacorta et al., 2023; Giannetti et al., 2023; Mueller and Sfrappini, 2022; De Cicco, Gschossmann and Kok, 2025), underscoring how this form of grey literature serves as a valuable complement to academic research which is typically based on accounting indicators (Minnetti et al., 2025; G. Birindelli, Quas et al., 2025; Gallucci, Santulli and Tipaldi, 2025; Priem and Gabellone, 2024). The evidence seems to converge on the notion that firms with stronger ESG disclosures or performance have better access to credit and face fewer financing constraints (Minnetti et al., 2025; G. Birindelli, Quas et al., 2025; Gallucci, Santulli and Tipaldi, 2025; Priem and Gabellone, 2024; Pietrovito and Rancan, 2024). These effects have become more pronounced after major climate-policy and supervisory milestones, such as the Paris Agreement and the ECB's 2022 climate stress test (De Cicco, Gschossmann and Kok, 2025). However, banks differ in their lending responses. Banks with stronger ESG profiles and more substantive sustainability disclosures are more likely to reallocate credit towards sustainable firms. In contrast, banks with weaker ESG performance, more symbolic disclosure practices, or close ties to brown borrowers often continue to support carbon-intensive firms borrowers without sufficiently adjusting credit volumes or pricing (Mueller and Sfrappini, 2022; Giannetti et al., 2023; Gambacorta et al., 2023). As in the post-crisis literature on zombie lending, this may postpone risk recognition and create vulnerabilities that materialise only when underlying risks are eventually realised. Overall, the findings suggest that climate-related considerations are playing a growing role in credit allocation. At the same time, banks' own sustainability characteristics, disclosure practices, and existing lending relations remain important drivers of financing outcomes.

4.3 Indirect channels

Evidence on the indirect information channel through market efficiency The subset of studies that investigate market efficiency outcomes examines whether information on firms' ESG performance is perceived as value relevant by investors and whether ESG disclosures mitigate or exacerbate market frictions that affect the efficient functioning of financial markets. Overall, they suggest that ESG disclosures and ESG performance indicators are decision-relevant to investors and incorporated into asset prices (e.g. Ziegler, Busch and Hoffmann, 2011; Di Tommaso and Mazzuca, 2023; Cellier, Chollet and Gajewski, 2016), alongside climate policies (Giuliana Birindelli et al., 2023; G. Birindelli, Chiappini and Jalal, 2023; Fiordelisi, Ricci and Santilli, 2025) and ESG disclosure regulation (Bassen et al., 2025). However, the evidence is not unequivocal, as some studies find that markets do not react to greenwashing news and ESG-related controversies (Teti, Etro and Pausini, 2024; Anselmi and Petrella, 2025; Mazzacurati, 2023).

Beyond value relevance, this body of research highlights the potential role of ESG disclosures in enhancing market efficiency. Several studies show that ESG disclosures can mitigate behavioural biases, including optimism bias and market myopia (Del Rio, Ferrer and López-Arceiz, 2024; Del Rio, López-Arceiz and Muga, 2023). Others document that ESG disclosures are associated with narrower bid-ask spreads and lower analyst forecast dispersion (R. Wang et al., 2024; Khan et al., 2024). Taken together, these findings point to a reduction in information asymmetries between firms and investors, as well as improvements in price discovery and market liquidity. At the same time, however, contrasting evidence suggests that ESG disclosures may lead to increased uncertainty and disagreement, misvaluation and overreaction (Bachner, 2025; Barka, Hamza and Mrad, 2023).

Nevertheless, regardless whether these effects are positive or negative, the broader implication is that ESG disclosures seem to influence the information environment in which investment decisions are made. As such, evidence that investors respond to ESG disclosures represents a necessary precondition for ESG disclosures to affect capital allocation and the cost of capital. Similarly, evidence that ESG disclosures shape market frictions suggests a possible pathway through which disclosure practices can generate long-term effects on financing conditions and the allocation of financial resources across firms.

Firm financial performance The literature linking firms' ESG performance and disclosures to their financial performance yields mixed results. While several studies document positive relations between ESG performance and disclosure and financial performance indicators (Momtaz and Parra, 2025; Tonnarello et al., 2025; Khan et al., 2024; Sandberg, Al Sayed Noor and Tiberius, 2023; Gupta, 2025), valuation metrics (Casciello, Maffei and Zampella, 2025; Dou et al., 2025; Tonnarello et al., 2025; Khairiddine, Lacombe and Jarboui, 2024; Gabrielli, Marchini and Baldini, 2025), or risk measures (Porzio and Battaglia, 2024), others find mixed results (Bruna et al., 2022; Verbeeten, Gamerschlag and Moeller, 2016; Nekhili et al., 2017; Doni and Fiameni, 2024; Bianchi Martini et al., 2016; Landau et al., 2020), no statistically significant association (Neves et al., 2024; Kaspereit and Lopatta, 2016) or report negative relationships (Boungou and Dufau, 2025; Papathanasiou and Koutsokostas, 2024; Mittelbach-Hörmanseder, Hummel and Rammerstorfer, 2021; Quéré, Nouyrigat and Baker, 2018). Whether the overall effect is positive or negative appears to depend on firm characteristics, such as size and sector, as well as market expectations regarding the net costs and benefits of ESG-related activities, stricter climate policies, and disclosure requirements. Because ESG performance and disclosures can influence firm value, they may also indirectly affect firms' access to and cost of capital. However, the direction and magnitude of this effect remain

empirical questions.

In sum, the literature on market efficiency and firm performance highlights important associations between ESG disclosures and indirect channels, while leaving open the extent to which these effects translate into changes in capital allocation or cost of capital.

4.4 Moderating factors

Disclosure regime: materiality type and disclosure obligation As discussed in Section 4.1, the empirical evidence base is unevenly distributed across disclosure regimes. This challenge is compounded by the fact that many studies provide little or no information on key regime characteristics, such as whether disclosures are mandatory or voluntary and whether they are based on single or double materiality. This complicates a systematic assessment of these characteristics as possible moderators of the relation between ESG disclosures and the allocation and cost of capital for green investments.

Nevertheless, the evidence base on voluntary disclosures suggests that high-quality ESG disclosures are value relevant to investors (Orens, Aerts and Cormier, 2010). They are also associated with lower information asymmetries in financial markets (Fuhrmann et al., 2017) and stronger firm financial performance (Momtaz and Parra, 2025; Nekhili et al., 2017; Liesen et al., 2017; Verbeeten, Gamerschlag and Moeller, 2016; Gabrielli, Marchini and Baldini, 2025). At the same time, investors appear to take account of the costs of ESG disclosure in voluntary settings. Costly third-party assurance, certification, and ESG governance are negatively associated with firm performance and value in some studies (Neves et al., 2024; Landau et al., 2020; Nekhili et al., 2017). Evidence on capital allocation and the cost of capital is more mixed. Some studies find more favourable funding conditions for ESG-disclosing firms (Orens, Aerts and Cormier, 2010; Carbone et al., 2021; Pietsch and Salakhova, 2022), whereas others find no significant effect (Giannetti et al., 2023; Martí-Ballester, 2015; Balitzky and Reiche, 2023). Evidence on “double materiality”-type disclosures points in a similar direction. Studies suggest that investors value and price high-quality information on how firms affect the environment and society, as well as signals of alignment with voluntary standards such as the Global Reporting Initiative, the United Nations Sustainable Development Goals, and the Principles for Responsible Banking (Fuhrmann et al., 2017; Verbeeten, Gamerschlag and Moeller, 2016; Gabrielli, Marchini and Baldini, 2025; Giannetti et al., 2023; Pietsch and Salakhova, 2022). However, markets may also question the credibility of such disclosures and alignments (Fiordelisi, Ricci and Santilli, 2025). Overall, the voluntary disclosure evidence suggests that ESG information can affect capital market outcomes, but that its effects depend on disclosure quality, credibility, and the costs associated with producing and verifying such information.

Box 1: The EU Sustainable finance framework at a glance

For the purpose of this review, the search on mandatory ESG disclosure rules covered the main legal acts in the EU sustainable finance framework, which is anchored in a double-materiality logic, most explicitly under the corporate disclosure directives (see below). The legislations within this framework can be grouped into two broad categories. The first category concerns what counts as sustainable or “green”. The

central instrument is the EU Taxonomy Regulation (TR, Regulation (EU) 2020/852), which establishes a classification system to determine whether economic activities in the EU are “green” or “environmentally sustainable”, including the principle of “do no significant harm”. Listed and large (including non-listed) companies must report the share of their activities that qualify as environmentally sustainable in a harmonised way. In addition, the EU Green Bond Standard Regulation (EuGBS, Regulation (EU) 2023/2631) establishes a voluntary framework for issuers wishing to use the “European Green Bond” (EuGB) label. To use this label, issuers must allocate all net proceeds to activities that meet TR criteria, subject to a flexibility margin of up to 15% for Taxonomy-aligned activities where detailed screening criteria are not yet defined. They must also publish specified information on the use of proceeds and environmental impact and obtain assessments from supervised external reviewers.

The second category defines what information must be disclosed. The Sustainable Finance Disclosure Regulation (SFDR, Regulation (EU) 2019/2088) obliges financial institutions and advisers such as banks, insurers, pension funds and asset managers to explain how they integrate sustainability risks, disclose significant negative environmental and social impacts, and classify financial products under Articles 6, 8, or 9 so that investors can better gauge how “green” these products are. The Corporate Sustainability Reporting Directive (CSRD, Directive (EU) 2022/2464), which updates the Non-Financial Reporting Directive (NFRD, Directive 2014/95/EU), requires large and listed companies to issue standardised sustainability reports covering environmental and social impacts and related risks.

As for mandatory disclosures, the evidence on the impact of the EU sustainable finance framework (see Box 1) on the allocation and cost of capital for green investments remains limited and incomplete (see Table 4.4 for an overview of the literature). This is partly attributable to the relatively recent implementation of these regulations. Consistent with this interpretation, most studies on mandatory ESG disclosures in the EU focus on earlier frameworks, notably NFRD and the SFDR, which were adopted in 2014 and 2019, respectively. At the same time, the existing literature shows that implications for the cost of capital are under-represented. While the SFDR literature logically concentrates on fund portfolio allocation and investment flows, the NFRD and CSRD, by mandating firm-level ESG disclosures, offer scope to study effects on firm financing outcomes. However, studies on these firm-level disclosure regimes primarily focus on short-term market reactions and firm performance, rather than on realised allocation or financing costs.

Despite these limitations, the emerging evidence suggests that the NFRD and SFDR are associated with shifts in capital allocation towards green investments. In addition, initial evidence indicates that the TR is associated with lower funding costs for “dark green” bond issuers (Ghitti et al., 2025). Mandatory ESG disclosures have also been linked to reductions in market uncertainty (Arif, Gan and Nadeem, 2022), and several studies show that capital markets incorporate expectations about regulatory developments (Grewal, Riedl and G. Serafeim, 2019; Bassen et al., 2025). At the same time, these findings, together with evidence from the firm performance literature, point to transitional challenges associated with the EU sustainable finance legislation.

The literature highlights several transitional frictions linked to mandatory ESG disclosure regimes. The complexity of defining “what is green”, regulatory uncertainty, and anticipated compliance costs for firms emerge as factors being reflected in market reactions and firm-level outcomes. With respect to

measurement complexity, evidence on the effects of the SFDR on redirecting capital towards sustainable investments is sensitive to how sustainability is defined and measured (Abouarab, Mishra and Wolfe, 2025; Sanctuary et al., 2025; Scheitza and Busch, 2024; Popescu et al., 2023; Mazzolini et al., 2025). Regarding firm-level disclosure requirements, there are initial indications that markets price regulatory risk alongside sustainability information (McGee et al., 2025; Bassen et al., 2025; Bounvou and Dufau, 2025). This pattern is consistent with findings from the literature on voluntary disclosures, which typically reports a positive association between non-financial disclosures and firm value or performance, but finds that this association weakens or turns negative for more costly disclosure forms, such as integrated reporting or third-party assurance (Neves et al., 2024; Landau et al., 2020). Overall, the evidence suggests that mandatory ESG disclosures may enhance market transparency and improve funding conditions for green investments, while simultaneously introducing new sources of cost and uncertainty during the transition towards regulated reporting frameworks.

Other potential moderating factors Although a comprehensive assessment of other factors moderating the relationship between ESG disclosures and capital market outcomes goes beyond the scope of this review, the evidence presented in the identified literature suggests that cultural and institutional factors matter. With respect to cultural aspects, ESG disclosures are found to be less value relevant in countries characterised by greater power distance, individualism, masculinity, and indulgence, and more value-relevant in countries with higher uncertainty avoidance and longer-term orientation (Casciello, Maffei and Zampella, 2025). Related to this, strategic withholding of information and selective reporting seems more pronounced in masculine cultural settings (de Vincentiis, 2024). Regarding institutional factors, research shows that strong ESG performance can partly compensate for weaker legal and institutional frameworks. In countries with weaker institutions, the negative link between ESG scores and the cost of capital is stronger (Priem and Gabellone, 2024). The development of financial institutions is also important. The development of financial institutions is also important. In countries with less developed financial institutions, higher ESG ratings are associated with lower leverage, meaning reduced access to credit. In countries with more developed financial institutions, the opposite relationship is observed (G. Birindelli, Quas et al., 2025). This indicates that banks place greater emphasis on ESG performance when extending credit than financial markets do.

The literature also suggests that characteristics of individual firms matter. Firm size is one such factor. Bruna et al. (2022) observe a U-shaped relation between ESG scores and financial performance, and find that efforts to improve ESG scores pay-off sooner for medium-sized and larger firms. Moreover, management and board characteristics seem to matter. For instance, financial markets seem to respond more strongly to ESG disclosures of family firms compared to non-family firms (Sekerici et al., 2022; Nekhili et al., 2017). These examples thus suggest that the relationship between ESG disclosures and capital market outcomes is shaped by a range of contextual and firm specific factors.

Table 1: EU sustainable finance framework - key insights from evidence base

Key reference	Entity	Outcome	Key insight	
Non-Financial Reporting Directive (NFRD)				
C. Huang and Mo (2025)	CTY	CA	✓	The introduction of the NFRD significantly enhanced ESG investment levels.
Minnetti et al. (2025)	NFC	CA	✓/0	Under the NFRD regime, firms’ sustainability is positively association with long-term debt as proxy for access to credit.
P. Huang et al. (2025)	NFC	FP	✓	Under the NFRD regime, double materiality reporting exhibits a significant positive association with firm value.
Bruna et al. (2022)	NFC	FP	✓	The ESG–financial performance relation is non-linear: only high-ESG performers, and medium or large size firms attain financial benefits. The ESG-financial performance relation seems to improve once the NFRD becomes applicable.
Arif, Gan and Nadeem (2022)	F&NFC	ME	✓	The introduction of the NFRD improved ESG disclosure quality, and led to lower uncertainty (earnings risk) in the market.
Grewal, Riedl and G. Serafeim (2019)	F&NFC	ME, FP	✓, ✕	News suggesting a higher probability of NFRD adoption triggers, on average, a negative stock market response, implying that equity investors expect the Directive to impose net costs.
EU Taxonomy Regulation (TR)				
McGee et al. (2025)	F&NFC	CoC	✕	The introduction of the TR is associated with increased risk premia for green bonds, which is reflective of investors seeking greater compensation for TR compliance risk and lack of transparency and accountability concerning the asset allocation of funds.
Tonnarello et al. (2025)	NFC	FP	✓	Following the introduction of the TR, firms reporting TR-alignment exhibit higher market value, profitability, and efficiency than those that do not.
Bassen et al. (2025)	F&NFC	ME	✓	Capital markets demand a TR-alignment compensation, suggesting that investors already incorporate the TR into their decisions and channel capital towards TR-aligned firms.
Ghitti et al. (2025)	NFC	CoC	✓	The Market prices green bonds with top second party opinion labels at a premium, but this effect vanishes once credit ratings are considered, indicating that second party opinion labels do not provide extra priced informations. The implementation of the TR increases green bond spreads.
Sustainable Finance Disclosure Regulation (SFDR)				
Distefano et al. (2025)	IF	FP	0	SFDR classification does not differentiate fund performance.
Abouarab, Mishra and Wolfe (2025)	IF	CA	✓/0	Art. 9 funds exhibit lower levels of greenwashing following the SFDR introduction compared to Art. 6 funds.
Sanctuary et al. (2025)	IF	CA	0	This is not the case for Art. 8 funds. Art.9 funds decarbonise their portfolios via a tilting strategy. With the exception of energy sector funds, Art. 9 and 8 funds are largely the same as conventional funds.

Key reference	Entity	Outcome		Key insight
Ramos, Cortez and Silva (2024)	IF	CA	✓	SFDR self-classification by funds aligns with government and NGO labels and ESG scores.
Scheitza and Busch (2024)	IF	CA	✓/×	Art. 9 funds vary considerably: while Art. 9 funds have ESG objectives, not all funds are truly impact-focused.
Popescu et al. (2023)	IF	CA	✓/0	Art. 9 funds have substantially lower relative carbon footprint compared to conventional funds, but not a lower weighted average carbon intensity.
Becker, Martin and Walter (2022)	IF	CA	✓	Following the introduction of the SFDR, EU funds improved their ESG scores, Art. 8 and 9 funds experienced net inflows, relative to a control group of non-EU funds.
<i>Mazzolini et al. (2025)</i>	IF	CA	0	Art. 9 funds allocate a larger share of their portfolios to low-carbon sectors, yet their overall carbon footprints remain similar to those of conventional funds. Art. 8 funds tend to invest in the same sectors as conventional funds but select less polluting firms. Overall, results reveal inconsistencies between ESG labels and outcomes.
<i>Schreiner and A. Beyer (2025)</i>	Banks	CA	✓	The SFDR/TR introduction has a dampening effect on banks' holdings, in particular those firms with poor ESG performance.
<i>Mosson (2024)</i>	IF	CA	0	SDG funds do not significantly differ from non-SDG or ESG funds regarding their alignment with the UN SDGs.
Corporate Sustainability Reporting Directive (CSRD)				
Boungou and Dufau (2025)	F&NFC	FP	×	The implementation of the CSRD led to an underperformance of stocks of EU-firms compared to non-EU ones.

Note: This table summarizes the key features and findings of the identified literature on the EU sustainable finance framework. The *Entity* column indicates the type of institution studied: CTY = country, NFC = non-financial companies, F&NFC = financial and non-financial companies, IF = investment funds, and PF = pension funds. Outcomes are classified by the author into cost of capital (CoC), capital allocation (CA), market efficiency (ME), and firm performance (FP). A ✓ indicates findings consistent with the intended objectives of the legislation, a “0” indicates mixed or no significant results, and × denotes findings that run counter to the intended objectives, based on the author’s judgement. References shown in italics represent grey literature.

5 Current gaps and limitations, and avenues for future research

The current evidence base exhibits several gaps and limitations that offer promising avenues for future research. Three key issues stand out.

First, evidence on the effects of ESG disclosures on the allocation and cost of capital for green investments remains limited, with considerable scope for expansion across both debt and equity markets. A substantial share of the studies identified in this review focuses on short-term market-efficiency effects, firm value or performance, rather than on realised financing outcomes. As discussed in Section 3.2, these outcomes constitute indirect channels through which ESG disclosures may affect capital allocation and pricing, but they do not, in themselves, demonstrate changes in access to, or the cost of, external finance. Future research should therefore address two related gaps: the direct link between ESG disclosures and financing outcomes, and the theoretical and empirical transmission mechanisms through which disclosure-related market, valuation, or performance effects may translate into actual changes in capital allocation and the cost of capital. While the literature on market efficiency and firm performance documents important associations between ESG disclosures and intermediate outcomes, it remains largely silent on whether and how these effects translate into longer-term changes in capital allocation or cost of capital. Bridging this gap represents a promising direction for future research. Establishing this transmission mechanism would also help identify whether, and to what extent, factors such as boilerplate reporting, greenwashing concerns, regulatory uncertainty, or variation in disclosure credibility condition the effect of ESG disclosures on capital-market outcomes.

Second, future research could more carefully distinguish between voluntary and mandatory disclosure regimes and specify the institutional and informational baseline against which disclosure effects are estimated. This distinction matters because disclosure effects are unlikely to depend solely on the formal introduction of a new rule. They may also reflect firms' and markets' prior exposure to voluntary reporting practices, soft-law expectations, sector-specific standards, or overlapping regulatory frameworks. At the same time, voluntary adoption of international disclosure standards may itself constitute a response to existing regulatory pressures or anticipated mandatory requirements. The relevant empirical challenge is therefore not only to separate voluntary from mandatory disclosure, but also to establish the timing, sequencing, and pre-treatment disclosure environment against which estimated effects are identified. Without such information, estimated effects may capture a combination of regulatory intervention, prior reporting practices, anticipatory behaviour, and broader institutional developments. This complicates the interpretation of findings and limits comparability across studies, jurisdictions, and time periods. Future work could therefore document the regulatory status of the disclosure regime and the relevant pre-treatment baseline, and characterise key design features of the disclosure framework to better contextualise the estimated effect of ESG disclosures. In this respect, the global mandatory ESG disclosure regulation dataset developed by Krueger et al. (2024) constitutes an important step forward, as it facilitates more systematic identification and comparison of disclosure regimes across jurisdictions and over time.

Third, future research could strive to more explicitly disentangle the effects of ESG disclosure from underlying ESG performance. As also noted by H. Christensen, L. Hail and C. Leuz (2021) and Christian Leuz and Wysocki (2016) this remains a central empirical challenge because firms' disclosure choices are unlikely to be independent of their sustainability profile, especially under voluntary reporting regimes. Mandatory disclosure regimes may mitigate this self-selection problem, at least partially, by extending reporting requirements to firms that would otherwise be less likely to disclose. Future research could

therefore exploit the adoption and implementation of mandatory sustainable finance regulation to examine whether disclosure effects vary with underlying ESG performance, and whether mandatory reporting changes the associations observed in voluntary settings. More broadly, there is substantial scope to deepen empirical analysis of evolving regulatory frameworks, including the EU Taxonomy, the CSRD, the European Green Bond Standard, and the ESG Rating Regulation. As these initiatives are phased in, systematic evaluation of both intended effects and potential unintended consequences will be important for assessing whether sustainable-finance regulation ultimately improves information quality, capital allocation, and the financing of green investments.

Beyond these three main issues, future research could also broaden its focus to other market participants, including insurance companies and pension funds. The identified literature predominantly concentrates on asset allocation by investment funds and on loan provision and pricing by banks. While this emphasis is consistent with the traditionally bank-based structure of European financial systems and the growing role of non-bank financial intermediation, large institutional investors such as pension funds and insurance companies remain comparatively underexplored. This is an important omission, given that their investment behaviour may materially influence capital-market outcomes.

6 Policy implications

The emerging but fragmented evidence reviewed in this study suggests that higher-quality ESG disclosures and stronger ESG performance are generally associated with improved access to capital and more favourable financing conditions. Although only a limited subset of studies directly evaluates EU sustainable finance legislation, the available findings indicate that some of the positive associations observed under voluntary disclosure regimes may also carry over to mandatory disclosure frameworks. This suggests that disclosure regulation can support the EU's sustainable finance objectives when it enhances the credibility, comparability and decision-usefulness of ESG information.

At the same time, the evidence also points to important qualifications. Capital markets may price anticipated compliance costs and risks and regulatory uncertainty, which can, in some settings, be associated with adverse effects on firm value or performance. Such effects may be transitory, particularly during the early stages of regulatory implementation, but they nevertheless underline the importance of clarity, simplicity, proportionality and predictability in the design and sequencing of disclosure requirements. Evidence indicating that institutional and cultural conditions moderate how ESG disclosures relate to capital market outcomes lends support to a degree of flexibility in implementation.

Viewed in this light, recent adjustments introduced through the EU Sustainable Finance Omnibus Packages can be interpreted as moving towards greater proportionality. Extended phase-in periods, reduced reporting burdens for smaller or less complex firms, and efforts to clarify and align requirements across the CSRD, EU Taxonomy and SFDR are consistent with preserving the informational value of ESG disclosures while limiting undue complexity, compliance costs and regulatory uncertainty. Overall, the evidence suggests that the effectiveness of EU sustainable finance regulation depends not only on expanding disclosure requirements, but also on ensuring that these requirements remain credible, usable and proportionate. A careful balance between harmonisation, flexibility and proportionality is therefore likely to be central to advancing the EU's sustainable finance objectives while mitigating potential adverse effects on market functioning and competitiveness.

7 Conclusion

Motivated by the introduction of the EU sustainable finance framework, this review developed a conceptual framework of the mechanisms linking ESG disclosures with intended capital market outcomes and mapped the current empirical evidence. In doing so, it complements the economic analysis and narrative review by H. Christensen, L. Hail and C. Leuz (2021), who focus on implications for the US context. The review shows that the evidence base remains emerging and fragmented, but generally points to positive associations between ESG disclosure or performance and capital market outcomes for green investments in the EU. While direct evidence on EU sustainable finance legislation remains limited, the identified literature suggests that some effects observed in voluntary settings may extend to mandatory disclosure regimes. At the same time, the evidence suggests that capital markets may anticipate regulatory compliance costs and risks. This can increase uncertainty and adversely affect firms, disrupt market functioning, and hinder the efficient allocation and pricing of capital.

The review further highlights implications for both the academic community and regulators. Researchers are called on to deepen the evidence base on how ESG disclosures affect the allocation and cost of capital, and to address several identification challenges. For regulators, the evidence provides cautious support for disclosure regulation as part of the sustainable-finance agenda, while underscoring the need for credible, usable, and proportionate requirements. Balancing harmonisation, flexibility, and proportionality will remain important for advancing the EU's objectives while limiting potential adverse effects on market functioning and competitiveness.

This review has several limitations. First, the rapid review design required the use of focused inclusion and exclusion criteria, which may have resulted in the exclusion of some relevant studies. Second, the search strategy was designed to identify studies directly linking ESG disclosure to capital allocation and the cost of capital. Consequently, it did not systematically capture all indirect channels or moderating factors through which ESG disclosure may influence these outcomes. These limitations should be considered when interpreting the findings and highlight the scope for further research on the transmission mechanisms linking ESG disclosure to real and financial investment outcomes. As the empirical evidence on the impact of mandatory ESG disclosures continues to grow following the adoption of ESG disclosure regulations, an updated review will be warranted in the future.

Declarations

Data availability Supplementary materials underlying this article are available at [include DOI]. They include the record identification and selection process, documented following the PRISMA protocol, the search queries used for Scopus, Web of Science, and EconLit, and supporting tables summarising key literature underpinning this review.

Affiliation The analyses and conclusions contained in this publication are solely those of the author. They do not purport to reflect the opinions or positions of any associated or affiliated academic, governmental, or private institutions of the author or any co-authors. Any mistakes are my own.

Funding The research presented in this publication did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of interest The author declares that there are no known conflicts of interest associated with this publication.

Declaration of generative AI and AI-assisted technologies in the writing process During the preparation of this publication, the author used AI tools (Writefull, Microsoft 365 Copilot) in order to revise writing clarity and style. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content presented in this dissertation.

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Supplementary Material

Appendix A Methodology

This online appendix provides supplementary materials concerning the methodology underlying the rapid review. Section [Appendix A](#) provides a detailed overview of the record identification and selection process following the PRISMA protocol. It also reports the distribution of included academic and grey literature across publication year, and documents the distribution of included academic records across journals. Section [Appendix A.2](#) documents the search query used to retrieve records from the academic databases, Scopus, Web of Science, and EconLit.

Appendix A.1 Methodology

The process for identifying relevant literature comprised four steps: pilot search, identification of relevant academic and grey literature, screening, and complementary search on mechanisms.

Pilot search

The review process was initiated with a pilot search designed to develop and refine the search query. This preliminary exploration provided an overview of the relevant literature and informed the final search terms. Drawing on the PICO framework commonly used in medicine (Deeks et al., 2023), I structured the search around the “population”, “intervention”, and “outcomes” of interest. Table 2 summarises the search framework. The corresponding queries for each data are reported in Section ([Appendix A.2](#)).

Table 2: Search framework and corresponding query elements

Framework	Search query elements
Population	Search terms capturing the European Union or euro area context, including terms for individual EU member states.
Intervention	A combination of commonly used keywords relating to both voluntary and mandatory ESG disclosures. This includes general disclosure terminology alongside explicit name searches for major voluntary initiatives (e.g., GRI, TCFD) and EU sustainable finance legislation (e.g., NFRD, SFDR, CSRD, CSDDD, EU Taxonomy).
Outcome	Search terms capturing the outcome variables (and common synonyms), namely capital allocation and cost of capital.

Identification of relevant literature

The second step entailed systematic searches in the selected academic databases and grey literature sources. This section describes the procedures used to identify the relevant academic and grey literature. Figure 2 provides an overview of the record identification process following the PRISMA protocol (PRISMA Statement, 2020; Moher et al., 2015; Page, McKenzie and Bossuyt, 2021).

To identify relevant academic literature, I applied the search query to Scopus, Web of Science, and EconLit. Scopus and Web of Science provide broad multidisciplinary coverage, while EconLit is the authoritative source for economics and finance literature. I applied four inclusion criteria. First, I considered

articles published between 2010 and 2025. The pilot search indicated that most ESG-related studies were published in this period, while earlier work constituted a relatively marginal strand. More importantly, this period corresponds to the development of the EU sustainable finance regulatory framework, whose foundations were established in 2014 and advanced substantially after the launch of the European Green Deal in 2018 (European Commission, 2018; European Commission, 2021). Second, I included only English-language publications. Third, I considered only peer-reviewed articles and review articles. Fourth, I confined the search to Economics and Finance.

The database searches were conducted on 21 February 2026, and all eligible records were retrieved on that date. In total, 3,533 records were identified, corresponding to 2,377 unique articles after deduplication.⁶ I then retained only articles published in journals classified as Quartile 1 (Q1) according to the Scopus (SCImago) Journal Rank (SJR) and rated A*, A, or B by the Australian Business Deans Council (ABDC). These criteria yielded 828 records for screening.

Grey literature was obtained from the European Central Bank (ECB) and the European Supervisory Authorities (ESAs): the European Banking Authority (EBA), the European Insurance and Occupational Pensions Authority (EIOPA), and the European Securities and Markets Authority (ESMA). Given their mandates and access to proprietary supervisory datasets, these institutions are likely to produce analytical work relevant to the research questions and complementary to academic studies.

Within each website, I searched publication repositories using keyword filters related to the research topic, including “sustainable finance”, “climate”, and “green”. The grey literature search was conducted on 5 January 2026, and all eligible documents were retrieved on that date. After deduplication, 174 unique records were identified. I retained only analytical publications, resulting in 80 records; non-analytical or predominantly opinion-based materials, such as guidelines, opinions, and recommendations, were excluded.

Screening

Third, I conducted a two-stage manual relevance screening.⁷ Given that the identification strategy resulted in a relatively limited set of records (828 journal articles and 80 grey literature records), I opted for manual screening rather than using AI-tools. The screening procedure comprised title-abstract screening followed by full-text screening. The screening process was aimed at identifying which of the retrieved studies empirically assessed the relation between voluntary or mandatory ESG disclosures and capital allocation or cost of capital in Europe.

This process yielded 82 journal articles and 18 grey literature documents. Because one grey literature document corresponded to a journal article publication, I removed it from the grey literature set. The remaining records were assessed using tailored quality criteria.⁸ No further records were excluded.

Inclusion

Based on this search strategy, a total of 99 documents were included: 82 academic records and 17 grey literature documents. Table 3 provides an overview of the distribution of the included academic articles

⁶Zotero was used for the deduplication process.

⁷Excel was used to document the screening process.

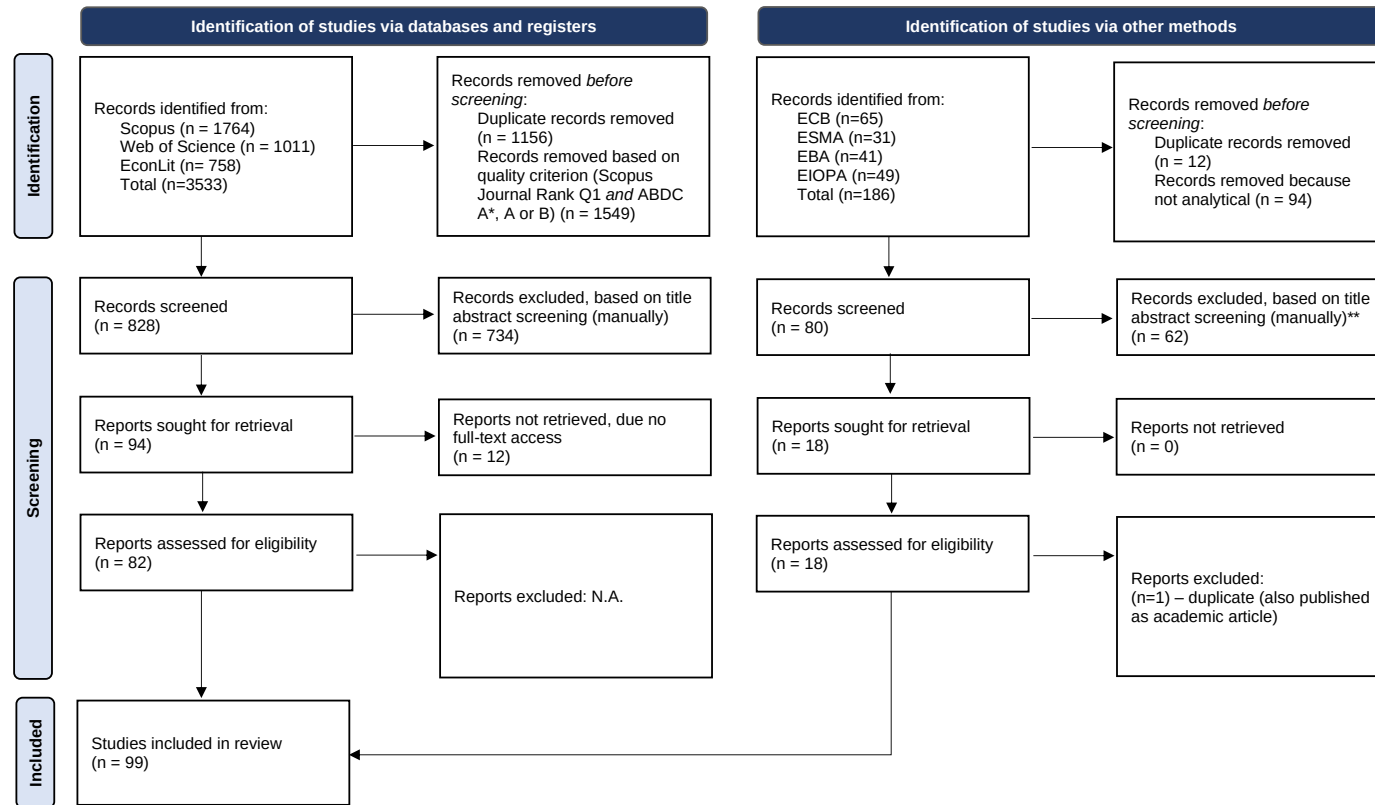
⁸Concretely, quality assessment was based on the following criteria: 1) clearly formulated research question and/or hypothesis, 2) clearly formulated research methodology, 3) data transparency, 4) minimum statistical reporting, 5) research question is answered.

across journals. Figure 3 provides an overview of the distribution of publication years across both academic and grey literature.

Complementary search on mechanisms

Finally, I conducted a complementary search on the mechanisms governing the relation between (ESG) disclosures and the allocation and cost of capital. Understanding these mechanisms is essential for understanding how the intervention under study may lead to the observed outcome, and whether multiple, potentially competing mechanisms operate in a given context. The complementary search was guided by the theoretical frameworks most frequently referenced in the empirical studies included in the review.

Figure 2: Overview of record identification and selection process (following the PRISMA protocol)



Source: Author

Source PRISMA Framework: Page MJ, et al. BMJ 2021;372:n71. doi: 10.1136/bmj.n71. This work is licensed under CC BY 4.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by/4.0/>

Figure 3: Distribution of publication years of included academic and grey literature

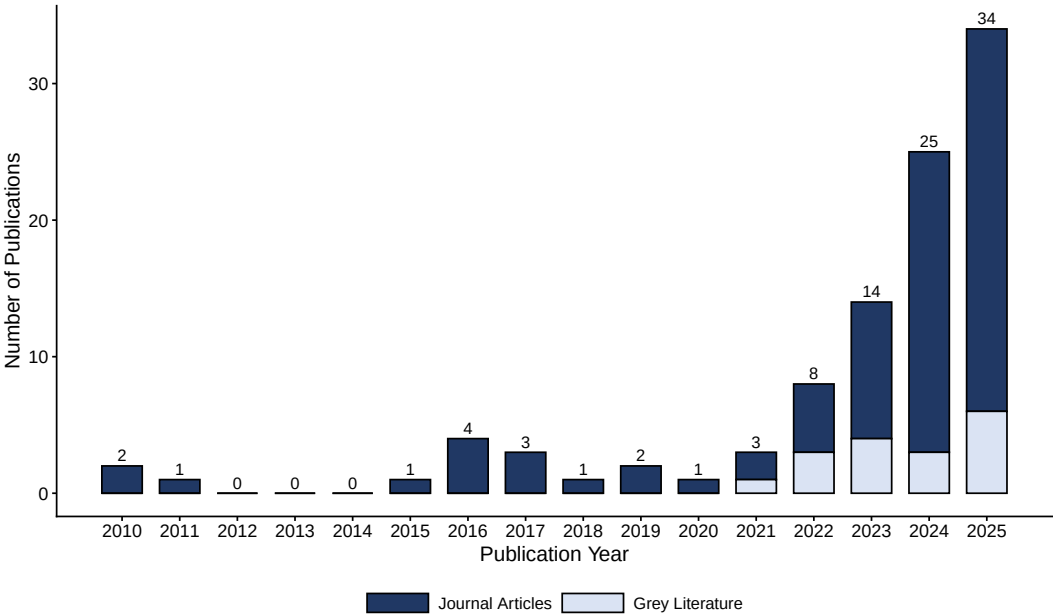


Table 3: Distribution of included academic articles across journals

Note: This table presents the distribution of the included academic articles across journals, along with their Scopus quartile rankings and ABDC scores. The Scopus quartile corresponds to the journal's ranking in the year the article was published, except for articles published in 2025, for which the 2024 ranking is used due to data unavailability. ABDC scores are updated triennially; accordingly, articles published in 2010–2012 are assigned the 2010 rating, those from 2013–2015 the 2013 rating, those from 2016–2018 the 2016 rating, those from 2019–2021 the 2019 rating, and those from 2022–2025 the 2022 rating. The updated ABDC ranking for 2025 was not yet available.

Publication Title	Scopus	ABDC		
	Quartile	A*	A	B
<i>Accounting and Business Research</i>	Q1		1	
<i>British Accounting Review</i>	Q1	2		
<i>British Journal of Management</i>	Q1		1	
<i>Business and Society</i>	Q1		1	
<i>Business Ethics</i>	Q1			1
<i>Business Strategy and the Environment</i>	Q1		11	
<i>Critical Perspectives on Accounting</i>	Q1		1	
<i>Ecological Economics</i>	Q1		1	
<i>Economic Modelling</i>	Q1		1	
<i>Energy Economics</i>	Q1		1	
<i>Entrepreneurship: Theory and Practice</i>	Q1	1		
<i>European Accounting Review</i>	Q1	1		
<i>European Business Review</i>	Q1			1
<i>European Financial Management</i>	Q1		1	
<i>European Journal of Finance</i>	Q1		3	
<i>Finance Research Letters</i>	Q1		12	
<i>International Journal of Productivity and Performance Management</i>	Q1			1
<i>International Review of Economics and Finance</i>	Q1		7	
<i>International Review of Financial Analysis</i>	Q1		7	
<i>Journal of Banking and Finance</i>	Q1	1		
<i>Journal of Business Ethics</i>	Q1		3	
<i>Journal of Business Finance and Accounting</i>	Q1		2	
<i>Journal of Business Research</i>	Q1		1	
<i>Journal of Financial Stability</i>	Q1		2	
<i>Journal of Intellectual Capital</i>	Q1			1
<i>Journal of International Financial Markets, Institutions and Money</i>	Q1		1	
<i>Management Decision</i>	Q1			3
<i>Management Science</i>	Q1	1		
<i>Meditari Accountancy Research</i>	Q1		1	
<i>Quantitative Finance</i>	Q1		1	
<i>Research in International Business and Finance</i>	Q1			7
<i>Small Business Economics</i>	Q1		1	
<i>Sustainability Accounting, Management and Policy Journal</i>	Q1			2
Total	82	6	60	16

Appendix A.2 Search query

Table 4: Search query framework and Boolean search blocks – Scopus

Framework	Boolean search block – Scopus	Note
Population	{EU} OR Europ* OR "euro zone" OR "euro area" OR Austria* OR Belgi* OR Bulgaria* OR Croatia* OR Cypr* OR Czech* OR Denmark OR Danish OR Estonia* OR Finland OR Finnish OR France OR French OR German* OR Greece OR Greek OR Hungar* OR Ireland OR Irish OR Ital* OR Latvia* OR lithuania* OR Luxembourg* OR Malt* OR Netherlands OR Dutch OR Poland OR Polish OR Portug* OR Romania* OR Slovakia* OR Slovenia* OR Spain OR Spanish OR Swed* OR "UK" OR "United Kingdom" OR "Great Britain"	<i>Geographical focus: the EU, euro area, or EU member states</i>
Intervention	{NFRD} OR "Non-financial reporting directive" OR {SFDR} OR "Sustainable finance disclosure regulation" OR (("Art* 8" OR "Art* 9" OR "light green" OR "dark green") W/2 (fund OR classif* OR label*)) OR {CSRD} OR "Corporate Sustainability Reporting Directive" OR {CSDDD} OR "Corporate Sustainability Due Diligence Directive" OR "Taxonomy Regulation" OR "EU Taxonomy" OR "EU green bond" OR "EU green bond standard" OR EuGBS## OR "ESG rating regulation" OR "EU sustainable finance" OR {ESRS} OR "European Sustainability Reporting Standards" OR ({ESG} OR "environmental social governance" OR {CSR} OR "corporate social responsib*" OR sustainab* OR climate OR "non-financial" OR "single materiality" OR "double materiality") W/2 (disclos* OR report* OR rating OR label OR transparen* OR standard* OR regulat* OR legisl* OR policy OR recommendation OR guideline) OR {GRI} OR "global reporting initiative" OR "carbon disclosure project" OR {TCFD} OR "task force on climate-related financial disclosures" OR "task force on climate related financial disclosures" OR {NGFS} OR "network for greening the financial system" OR "UN global compact" OR "UNGC CoP" OR "ICMA green bond principles" OR "ICMA GBP" OR "climate bonds standard" OR "Sustainability Accounting Standards Board" OR {SASB}	<i>Mandatory ESG disclosures (legislation)</i> <i>Voluntary ESG disclosures</i>
Outcome	((cost W/2 (capital OR equity OR debt OR financ* OR fund* OR lend* OR borrow*)) OR ((loan OR borrow* OR lend* OR financ* OR funding) W/2 (condition OR term)) OR "return on equity" OR WACC OR spread OR yield OR greenium OR premium OR allocat* OR tilt* OR portfolio OR invest* OR (fund W/2 flow) OR greenwash*)	<i>Allocation and cost of capital</i>

Notes: This table documents the Boolean search block syntax used identify potentially relevant literature in Scopus. The search blocks were applied to the TITLE-ABS-KEY field, and then combined using the AND operator. To refine the search and ensure relevance to the research questions, the search results were limited to records with the document type Article (ar) or Review Article (re) and publication stage "final". In addition, only publications indexed under the Scopus subject areas "Economics" or "Business" were included. The search was restricted to English language publications with a publication date between 1 January 2010 and 31 December 2025.

Table 5: Search query framework and Boolean search blocks – Web of Science example

Framework	Boolean search block – Web of Science	Note
Population	"EU" OR Europ* OR "euro zone" OR "euro area" OR Austria* OR Belgi* OR Bulgaria* OR Croatia* OR Cypr* OR Czech* OR Denmark OR Danish OR Estonia* OR Finland OR Finnish OR France OR French OR German* OR Greece OR Greek OR Hungar* OR Ireland OR Irish OR Ital* OR Latvia* OR Lithuania* OR Luxembourg* OR Malt* OR Netherlands OR Dutch OR Poland OR Polish OR Portug* OR Romania* OR Slovakia* OR Slovenia* OR Spain OR Spanish OR Swed* OR "UK" OR "United Kingdom" OR "Great Britain"	<i>Geographical focus: the EU, euro area, or EU member states</i>
Intervention	"NFRD" OR "Non-financial reporting directive" OR "SFDR" OR "Sustainable finance disclosure regulation" OR (("Art* 8" OR "Art* 9" OR "light green" OR "dark green") NEAR/2 (fund OR classif* OR label*)) OR "CSRD" OR "Corporate Sustainability Reporting Directive" OR "CSDDD" OR "Corporate Sustainability Due Diligence Directive" OR "Taxonomy Regulation" OR "EU Taxonomy" OR "EU green bond" OR "EU green bond standard" OR EuGBS\\$ OR "ESG rating regulation" OR "EU sustainable finance" OR "ESRS" OR "European Sustainability Reporting Standards" ("ESG" OR "environmental social governance" OR "CSR" OR "corporate social responsib*" OR sustainab* OR climate OR "non-financial" OR "single materiality" OR "double materiality") NEAR/2 (disclos* OR report* OR rating OR label OR transparen* OR standard* OR regulat* OR legis* OR policy OR recommendation OR guideline) OR "GRI" OR "global reporting initiative" OR "carbon disclosure project" OR "TCFD" OR "task force on climate-related financial disclosures" OR "task force on climate related financial disclosures" OR "NGFS" OR "network for greening the financial system" OR "UN global compact" OR "UNGC CoP" OR "ICMA green bond principles" OR "ICMA GBP" OR "climate bonds standard" OR "Sustainability Accounting Standards Board" OR "SASB"	<i>Mandatory ESG disclosures (legislation)</i> <i>Voluntary ESG disclosures</i>
Outcome	(cost NEAR/2 (capital OR equity OR debt OR financ* OR fund* OR lend* OR borrow*)) OR ((loan OR borrow* OR lend* OR financ* OR funding) NEAR/2 (condition OR term)) OR "return on equity" OR WACC OR spread OR yield OR greenium OR premium OR allocat* OR tilt* OR portfolio OR invest* OR (fund NEAR/2 flow) OR greenwash*	<i>Allocation and cost of capital</i>

Notes: This table documents the Boolean search block syntax used identify potentially relevant literature in Web of Science. The search blocks were applied to the Title, Abstract, and Author Keywords fields, and then combined using the AND operator. To refine the search and ensure relevance to the research questions, the search results were limited to records with the document type "Article" or "Review Article". In addition, only publications indexed under the Web of Science categories "Economics", "Management", "Business", or "Business Finance" were included. The search was restricted to English language publications with a publication date between 1 January 2010 and 31 December 2025.

Table 6: Search query framework and Boolean search blocks – EconLit

Framework	Boolean search block – EconLit	Note
Population	("EU" OR Europ* OR "euro zone" OR "euro area" OR Austria* OR Belgi* OR Bulgaria* OR Croatia* OR Cypr* OR Czech* OR Denmark OR Danish OR Estonia* OR Finland OR Finnish OR France OR French OR German* OR Greece OR Greek OR Hungar* OR Ireland OR Irish OR Ital* OR Latvia* OR lithuania* OR Luxembourg* OR Malt* OR Netherlands OR Dutch OR Poland OR Polish OR Portug* OR Romania* OR Slovakia* OR Slovenia* OR Spain OR Spanish OR Swed* OR "UK" OR "United Kingdom" OR "Great Britain")	<i>Geographical focus: the EU, euro area, or EU member states</i>
Intervention	"NFRD" OR "Non-financial reporting directive" OR "SFDR" OR "Sustainable finance disclosure regulation" OR (("Art* 8" OR "Art* 9" OR "light green" OR "dark green") N2 (fund## OR classif* OR label*)) OR "CSRD" OR "Corporate Sustainability Reporting Directive" OR "CSDDD" OR "Corporate Sustainability Due Diligence Directive" OR "Taxonomy Regulation" OR "EU Taxonomy" OR "EU green bond" OR "EU green bond standard" OR EuGBS## OR "ESG rating regulation" OR "EU sustainable finance" OR "ESRS" OR "European Sustainability Reporting Standards" ("ESG" OR "environmental social governance" OR "CSR" OR "corporate social responsib*" OR sustainab* OR climate OR "non-financial" OR "single materiality" OR "double materiality") N2 (disclos* OR report* OR rating* OR label* OR transparen* OR standard* OR regulat* OR legis* OR policy OR policies OR recommendation* OR guideline*) OR "GRI" OR "global reporting initiative" OR "carbon disclosure project" OR "TCFD" OR "task force on climate-related financial disclosures" OR "task force on climate related financial disclosures" OR "NGFS" OR "network for greening the financial system" OR "UN global compact" OR "UNGC CoP" OR "ICMA green bond principles" OR "ICMA GBP" OR "climate bonds standard" OR "Sustainability Accounting Standards Board" OR "SASB"	<i>Mandatory ESG disclosures (legislation)</i> <i>Voluntary ESG disclosures</i>
Outcome	((cost## N2 (capital OR equity OR debt OR financ* OR fund* OR lend* OR borrow*)) OR ((loan## OR borrow* OR lend* OR financ* OR funding) N2 (condition## OR term##)) OR "return on equity" OR WACC OR spread## OR yield## OR greenium OR premium## OR premia OR allocat* OR tilt* OR portfolio## OR invest* OR (fund## N2 flow##) OR greenwash*)	<i>Allocation and cost of capital</i>

Notes: This table documents the Boolean search block syntax used identify potentially relevant literature in EconLit. The search blocks were applied to the Title (TI) , Abstract (AB), and subject (SU) fields, and then combined using the AND operator. To refine the search and ensure relevance to the research questions, the search results were limited to records with the document type "Journal Article" . In addition, only "peer reviewed" were included. The search was restricted to English language publications with a publication date between 1 January 2010 and 31 December 2025.

Appendix B Synthesis

Table 7: EU sustainable finance framework - overview of evidence (Part I)

Reference	Population		Obs period	Intervention	Comparator	Method
Non-Financial Reporting Directive (NFRD)						
C. Huang and Mo (2025)	EU	CTY	2001–2023	Post-NFRD introduction (2014)	pre-NFRD period	DiD (time dimension)
Minnetti et al. (2025)	IT	NFC	2018–2022	Variation in firm emissions intensity, under NFRD regime	Lower- vs higher-emission firms	FE
P. Huang et al. (2025)	EU	NFC	2019–2023	Variation in double materiality disclosure topics disclosed in annual reports, under NFRD regime	Firms that do not disclose certain topics	FE
Bruna et al. (2022)	Europe	NFC	2014–2019	Post-NFRD (2016), moderating ESG score–firm performance relation	Pre-NFRD	PCA; FE
Arif, Gan and Nadeem (2022)	Europe	F&NFC	2008–2018	Post-NFRD (2016), moderating ESG–earnings risk relation for EU firms	non-EU firms; pre-NFRD	PSM–DiD
Grewal, Riedl and G. Serafeim (2019)	Europe	F&NFC	2011–2014	NFRD announcement, agreement, and adoption events	Pre-NFRD regime	Event study
EU Taxonomy Regulation (TR)						
McGee et al. (2025)	EU	F&NFC	2015–2024	Post-TR (2020) period, moderating relation between green bond risk factors disclosures, incl. EU Taxonomy compliance, and bond yields, TR KPI disclosure by firms, post-TR proposal (2018)	Lower risk factor disclosure intensity and pre-TR period	NMF/PCA; FE
Tonnarello et al. (2025)	EU	NFC	2012–2022	High TR-alignment disclosures by firms, post-TR adoption (2020)	firms that do not disclose TR KPIs; pre-TR period	DiD
Bassen et al. (2025)	EU	F&NFC	2017–2020	“Dark-green” bond, post-TR application (2021)	Low-alignment firms (matched); Pre-TR period	PSM–DiD
Ghitti et al. (2025)	(global) Global	NFC	2013–2023		“Light-green” bonds; pre-TR period	DiD
Sustainable Finance Disclosure Regulation (SFDR)						
Distefano et al. (2025)	EU	IF	2021–2023	Article 9/8 funds	Reference group: Article 6 funds	PCA; HCA
Abouarab, Mishra and Wolfe (2025)	EU	IF	2016–2022	Post-SFDR introduction (2019) with Article 8/9 funds	Article 6/unclassified funds; pre-SFDR period;	PSM–DiD; RDD
Sanctuary et al. (2025)	EU	IF	2023	Article 9/8 funds	Reference group: Article 6 funds	NMDS
Ramos, Cortez and Silva (2024)	EU	IF	2021	Article 9/8 self-classification	Third-party sustainability classification	Logit
Scheitza and Busch (2024)	EU	IF	2022–2023	Article 9 funds	G7 sustainable investment typology	Stats

Reference	Population		Obs period	Intervention	Comparator	Method
Popescu et al. (2023)	EU	IF	2019	Article 9 funds	Conventional funds	Stats
Becker, Martin and Wal- ter (2022)	EU	IF	2019–2021	Post-SFDR adoption (2019) affecting EU funds	US-based funds; pre-SFDR period	DiD
<i>Mazzolini et al. (2025)</i>	EU	IF	2016–2021	Article 6/8/9 self-classification	Morningstar strategy categories	Stats
<i>Schreiner and A. Beyer (2025)</i>	EU	Banks	2015–2023	Post-SFDR adoption (2019), TR (2020), SFRD in force (2021) affecting EU banks	Banks headquartered outside the EU; Pre-SFRD periods	DiD
Corporate Sustainability Reporting Directive (CSRD)						
Boungou and Dufau (2025)	EU (global)	F&NFC	2020–2024	Post-CSRD proposal (2021) affecting EU firms	Non-EU firms	DiD

Note: This table documents key features of the identified literature on mandatory disclosures. The *Population* covers the geographical scope and entities studied. For geographical scope, the following abbreviations are used: EU= European Union, EA= Euro Area, Europe = European countries that include countries outside the EU, individual countries are designated by their ISO2 code. As for entities covered, the following abbreviations are used: CTY= country, NFC= non-financial companies, F&NFC= financial and non-financial companies, IF=investment funds, PF=pension fund. The Table further indicates the observation period covered, the type of ESG disclosure under consideration, and the methodological identification strategy. The references in italics represent grey literature.

Table 8: EU sustainable finance framework - overview of evidence (Part II)

[illegible]

References	CoC	CA	ME	FP	Measure	Key insight
Distefano et al. (2025)				0	fund return, risk, efficiency	SFDR classification does not differentiate fund performance.
Abouarab, Mishra and Wolfe (2025)		✓/0			Greenwashing index, carbon intensity, divestment	Art. 9 funds exhibit lower levels of greenwashing following the SFDR introduction compared to Art. 6 funds. This is not the case for Art. 8 funds. Art.9 funds decarbonise their portfolios via a tilting strategy.
Sanctuary et al. (2025)		0			Portfolio composition	With the exception of energy sector funds, Art. 9 and 8 funds are largely the same as conventional funds.
Ramos, Cortez and Silva (2024)		✓			Alignment of SFDR self-classification with government, NGO, and ESG labels	SFDR self-classification by funds aligns with government and NGO labels and ESG scores.
Scheitza and Busch (2024)		✓/×			Extent of impact investing in line with G7 principles	Art. 9 funds exhibit vary considerably: while Art. 9 funds have ESG objectives, not all funds are truly impact-focused.
Popescu et al. (2023)		✓/0			Carbon footprint and intensity	Art. 9 funds have substantially lower relative carbon footprint compared to conventional funds, but not a lower weighted average carbon intensity.
Becker, Martin and Walter (2022)		✓			ESG score, net fund flow	Following the introduction of the SFDR, EU funds improved their ESG scores, Art. 8 and 9 funds experienced net inflows, relative to a control group of non-EU funds.
Mazzolini et al. (2025)		0			Carbon footprint and intensity, extent of science based targets	Art. 9 funds allocate a larger share of their portfolios to low-carbon sectors, yet their overall carbon footprints remain similar to those of conventional funds. Art. 8 funds tend to invest in the same sectors as conventional funds but select less polluting firms. Overall, results reveal inconsistencies between ESG labels and outcomes.
Schreiner and A. Beyer (2025)		✓			share holdings of battery raw materials and mining companies	The SFDR/TR introduction has a dampening effect on banks' holdings, in particular those firms with poor ESG performance.
Mosson (2024)		0			Portfolio alignment with SDG	SDG funds do not significantly differ from non-SDG or ESG funds regarding their alignment with the UN SDGs.
Corporate Sustainability Reporting Directive (CSRD)						
Boungou and Dufau (2025)				×	Stock market performance	The CSRD implementation leads to an underperformance of EU-firms compared to non-EU ones.

Note: This table documents outcome measure(s) and key insights of the literature examining mandatory ESG disclosures and corresponds to Table 7. The outcomes are classified by the author as pertaining to cost of capital (CoC), capital allocation (CA), market efficiency (ME) or firm performance (FP). A ✓ signals that the documented study finds outcomes in line with the intended objective of the legislation; mixed or no significant results are indicated by a “0”, and outcomes that go against intended objectives are denoted by ×.

Table 9: Voluntary sustainability disclosures - overview of evidence (Part I)

Reference	Population		Obs. period	Intervention	Comparator	Method
Non-financial disclosure or integrated reports and third-party assurance						
Momtaz and Parra (2025)	ES	NFC	2012–2022	Voluntary ESG disclosure; third-party ISO assurance conditional on disclosure	Firms without ESG disclosure; disclosing firms without assurance	Staggered DiD
Neves et al. (2024)	PT	F&NFC	2015–2019	Voluntary ESG disclosure; third-party ISO assurance conditional on disclosure	Firms without ESG disclosure; disclosing firms without assurance	System GMM
Landau et al. (2020)	Europe	F&NFC	2015–2016	Voluntary ESG disclosure in integrated reports; assurance conditional on disclosure	Firms without integrated ESG disclosure; disclosing firms without assurance	Nested panel regression (Ohlson, 1995)
Fuhrmann et al. (2017)	Europe	F&NFC	2008–2009	GRI-aligned ESG disclosure; assurance conditional on disclosure	Reference group: firms without GRI-aligned disclosure; disclosing firms without assurance	PSM; cross-section OLS
Non-financial disclosure or integrated reports						
Nekhili et al. (2017)	FR	F&NFC	2001–2011	Voluntary ESG disclosure and/or CSR committee presence, interacted with family firm status	Firms without voluntary ESG disclosure	System GMM
Liesen et al. (2017)	Europe	NFC	2005–2009	Quantitative and complete GHG emissions disclosure	Firms with non-quantitative or incomplete GHG disclosure	Carhart four-factor model
Verbeeten, Gamerschlag and Moeller (2016)	DE	F&NFC	2005–2008	Variation in GRI-based ESG disclosure scores	Firms with lower ESG disclosure scores	Nested panel regression (Ohlson, 1995)
Orens, Aerts and Cormier (2010)	BE, FR, DE, NL (and CA, US)	NFC	2002–2022	Variation in ESG disclosure scores among European firms	Reference group: North American firms with lower ESG disclosure scores	Cross-section OLS; IV
Gabrielli, Marchini and Baldini (2025)	Europe	NFC	2018–2022	Variation in UN-SDG-aligned ESG disclosure scores	Firms with lower ESG disclosure scores	IV; system GMM
Giannetti et al. (2023)	EA	Banks	2014–2020	Variation in GRI-based ESG disclosure scores for banks	Banks with lower ESG disclosure scores	FE
Carbone et al. (2021)	Europe	NFC	2010–2019	ESG disclosure indicators moderating the GHG emissions–credit risk relation; climate transition disclosure by high-emitting firms post-Paris Agreement	Firms without ESG disclosure; low-emitting firms; firms without climate transition disclosure; pre-Paris Agreement period	FE; DiD

Reference	Population		Obs. period	Intervention	Comparator	Method
ESG label						
Fiordelisi, Ricci and Santilli (2025)	Europe	Banks	2022	Adherence to UNEP FI Principles for Responsible Banking moderating the climate risk–return relation	Reference group: non-signatory banks	Cross-section OLS
Martí-Ballester (2015)	ES	PF	2007–2013	Adoption of altruistic or strategic ESG investment strategies by pension funds	Pension funds without an ESG strategy	FE
Pietsch and Salakhova (2022)	EA	F&NFC	2016–2021	Externally reviewed green bonds, green issuers, and UNEP FI PRB-signatory banks	Green bonds without external review, brown firms, and non-PRB banks	FE
Balitzky and Reiche (2023)	Europe	F&NFC	2023	Green bond issuance and UN PRI signatory status	Reference group: conventional bond issuers and non-PRI firms	Cross-section OLS

Note: This table documents key features of the identified literature on voluntary disclosures. The *Population* covers the geographical scope and entities studied. For geographical scope, the following abbreviations are used: EU= European Union, EA= Euro Area, Europe = European countries that include countries outside the EU, individual countries are designated by their ISO2 code. As for entities covered, the following abbreviations are used: CTY= country, NFC= non-financial companies, F&NFC= financial and non-financial companies, IF=investment funds, PF=pension fund. The Table further indicates the observation period covered, the type of ESG disclosure under consideration, and the methodological identification strategy. The references in italics represent grey literature.

Table 10: Voluntary sustainability disclosures - overview of evidence (Part II)

References	CoC	CA	ME	FP	Measure	Key insight
Non-financial disclosure or integrated reports and third-party assurance						
Momtaz and Parra (2025)				✓	Net income	ESG reporting and third-party certification improve SMEs' financial performance, functioning as alternative sources of information. Certification gained importance following the Paris Agreement.
Neves et al. (2024)				×/0	ROE, ROA, Tobin's Q, EBITDA	ESG disclosures are weakly associated with reduced firm performance; ISO certifications fail to explain performance differences.
Landau et al. (2020)				×/0	Market value firm	ESG disclosures show a positive relationship with firm value, whereas integrated reporting shows a negative relationship. ISO certification, however, has no observable association with firm value.
Fuhrmann et al. (2017)			✓		Bid-ask spread	The adoption of a high-quality assurance process for ESG disclosures reduces information asymmetry in the market.
Non-financial disclosure or integrated reports						
Nekhili et al. (2017)				✓	Tobin's Q	Firm value is positively associated with CSR disclosures, and negatively associated with the presence of a CSR committee for family firms (and vice versa for non-family firms)
Liesen et al. (2017)			×	✓	Alpha (annualised)	While GHG emission disclosures are value relevant, financial markets failed to efficiently incorporate public information, as investors earned abnormal risk-adjusted returns by exploiting the undervaluation of GHG disclosure and strong climate performance.
Verbeeten, Gamerschlag and Moeller (2016)				✓	Share price, return	ESG disclosures are generally value-relevant, although more so for social information and not for environmental disclosures.
Orens, Aerts and Cormier (2010)	✓		✓		implied cost of equity, interest expense to debt ratio, bid-ask spread	In Europe, ESG disclosures are negatively associated with implied cost of equity and cost of debt, an a lower level of information asymmetry.
Gabrielli, Marchini and Baldini (2025)				✓	Market to book value	High-quality SDG disclosures are positively associated with market value, particularly when disclosures are substantive rather than symbolic.
Giannetti et al. (2023)	0	×			Volume of new loans offered, annualised interest rate offered	Banks that highlight the environmental in their disclosures grant more loans to brown firms but do not impose higher borrowing costs or shorter maturities. This pattern is not explained by banks funding firms' transition towards greener technologies.

References	CoC	CA	ME	FP	Measure	Key insight
<i>Carbone et al. (2021)</i>	✓				Credit rating, implied distance to default	High emissions are associated with higher credit risk, but disclosing emissions and setting forward looking reduction targets is associated with reduced credit risk.
ESG label						
Fiordelisi, Ricci and Santilli (2025)				✓	(Cumulative) abnormal return	Investors price physical and transition risk, as well as banks' adherence to the UNEP FI PRB.
Martí-Ballester (2015)		✗/0			Net fund inflows	Investors invest significantly less money in ethical pension plans than solidarity or traditional pension plans.
<i>Pietsch and Salakhova (2022)</i>	✓				Option adjusted bond spread (greenium)	Green bonds are associated with a greenium that is explained by the credibility of the green bond (being externally reviewed) and the green bond issuer (green sector, or banks being a signatory of the UNEP FI PRB).
<i>Balitzky and Reiche (2023)</i>	0				Bond yield	There is no significant association between a bond being labeled as green bond, social bond, sustainability(-linked) bond, and bond yield.

Note: This table documents outcome measure(s) and key insights of the literature examining voluntary ESG disclosures and corresponds to Table 9. The outcomes are classified by the author as pertaining to cost of capital (CoC), capital allocation (CA), market efficiency (ME) or firm performance (FP). A ✓ signals that the documented study finds outcomes in line with the intended objective of the legislation; mixed or no significant results are indicated by a “0”, and outcomes that go against intended objectives are denoted by ✗.

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