FINANCING THE GREEN TRANSITION

Evidence from green bond markets and sustainable finance regulation in Europe

Anouk Levels

Institute for Management Research

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Financing the green transition

Evidence from green bond markets and sustainable finance regulation in Europe

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from Radboud University Nijmegen
on the authority of the Rector Magnificus prof. dr. J.M. Sanders,
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List of abbreviations

CBI Climate Bond Initiative

CMU Capital Markets Union

CSDDD Corporate Sustainability Due Diligence Directive (Directive (EU) 2024/1760)

CSR Corporate Social Responsibility

CSRD Corporate Sustainability Reporting Directive (Directive (EU) 2022/2464/EU)

DNB De Nederlandsche Bank

EBA European Banking Authority

EC European Commission

ECB European Central Bank

EIOPA European Insurance and Occupational Pensions Authority

ESAs European Supervisory Authorities

ESCB European System of Central Banks

ESG Environmental, Social and Governance

ESMA European Securities and Markets Authority

EU European Union

EuGB European Green Bond

EuGBS EU Green Bond Standard Regulation (Regulation (EU) 2023/2631)

FSB Financial Stability Board

GBP Green Bond Principles

GRI Global Reporting Initiative

ICMA International Capital Market Association

ISIN International Security Identification Number

ISO International Organization for Standardization

NFRD Non-Financial Reporting Directive (Directive 2014/95/EU)

PRB United Nations Environment Programme Finance Initiative's Principles for Responsible Banking

PRI Principles for Responsible Investment

SASB Sustainable Accounting Standards Board

SFDR Sustainable Finance Disclosure Regulation (Regulation (EU) 2019/2088)

SHS Securities Holdings Statistics

SIU Savings and Investments Union

TCFD Task Force on Climate-related Financial Disclosures

TR Taxonomy Regulation (Regulation (EU) 2020/852)

UN SDGs United Nations Sustainable Development Goals

UNGC United Nations Global Compact

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Chapter 1

Introduction

1.1 Motivation

Achieving the European Union's objective of climate neutrality by 2050 (European Commission, 2019a) requires a large-scale reallocation of private capital towards sustainable investment projects. Given the limited capacity of public budgets, the success of the green transition critically depends on the ability of financial markets to mobilise and allocate private savings efficiently (European Commission, 2019a). To mobilise private capital for the green transition, the European Union (EU) has established a comprehensive sustainable finance framework since 2018 that revolves around improving transparency through environmental, social and governance (ESG) disclosure legislation (see Box 1 for an overview of the main initiatives).

This legislative framework is part of a broader strategy to deepen capital market integration in the EU (European Parliament, 2025; European Commission, 2025a). Compared to the United States, European capital markets are more fragmented and characterised by lower levels of cross-border investment. This fragmentation is considered an impediment to mobilising Europe's large pool of savings for productive investment (Draghi, 2024), including investments that support the green transition. In this context, deeper capital market integration can be understood as increased investor participation across jurisdictions. By broadening firms' investor bases, greater integration has the potential to lower financing costs and support a more efficient allocation of capital (see also Merton, 1987).

The objective of the EU's sustainable finance framework is to improve the transparency, comparability and credibility of ESG disclosures, thereby reducing information asymmetries and associated market frictions. This, in turn, is intended to facilitate cross-border investment, redirect capital towards green investment projects and create more favourable financing conditions for these projects. However, despite these ambitions, the extent to which such ESG

disclosure legislation can influence capital market outcomes in line with policy objectives remains an open empirical question.

First, the existing literature in economics and finance finds mixed evidence on the relation between corporate disclosures and capital market outcomes. While information and disclosure are not explicitly modelled in traditional neoclassical economics and asset pricing theories (Sharpe, 1964; Lintner, 1965; Fama and MacBeth, 1973; Fama and French, 1993), these frameworks nonetheless imply a disclosure mechanism (Cai, 2023): if disclosures help investors better assess how firms' cash flows co-move with the market, the cost of capital may fall (increase) and capital may reallocate towards (away from) firms that are expected to move more (less) in line with the market. Moreover, disclosures with broader, market-wide implications could affect the cost of capital across the board. Information economics provides further insight into the underlying mechanisms by introducing more realistic assumptions about market structure and investor behaviour, and studies in this field that formally embed corporate disclosures generally confirm the intuition implied by neoclassical theory (Lambert, Leuz and Verrecchia, 2007; Hughes, Liu and Liu, 2007; Lambert, Leuz and Verrecchia, 2012; Jorgensen and Kirschenheiter, 2003; Cheynel, 2013). However, whether disclosures ultimately lead to more efficient capital allocation and lower funding costs depends on several factors, including investor characteristics (for instance sophisticated versus unsophisticated investors, see e.g. Hughes, Liu and Liu (2007) and Lambert, Leuz and Verrecchia (2012)) and whether disclosures reduce or increase disagreement among investors (Bloomfield and Fischer, 2011; P. O. Christensen and Qin, 2014). In this sense, while the literature generally suggests that corporate disclosures are related to more efficient allocation and pricing of capital, the net effect ultimately remains an open empirical question.

The current evidence is even more conflicting when zooming in on the relation between corporate disclosures and cross-border capital allocation. A large body of literature documents that investors tend to overinvest in domestic financial assets. This persistent empirical phenomenon, commonly referred to as 'home bias' in international finance and portfolio choice literature,[1] is said to hamper efficient capital allocation and risk sharing in the broader market, leaving companies with fewer funding options and higher funding costs (see e.g. Merton (1987) and Sorensen et al. (2007)). Since the 1980s, several partly competing and partly complementing explanations have been proposed (Ardalan, 2019).[2]

[1] According to the seminal international capital asset pricing model (see Sharpe (1964) and Solnik (1974)), in frictionless markets with complete information, rational investors should hold financial assets in proportion to the assets' respective shares in the global market portfolio. Any over-weighting of domestic assets would lead to a suboptimal risk-return profile.

[2] These explanations range from deviations from purchasing power parity (e.g. Adler and Dumas (1983), Cooper and Kaplanis (1994), Lewis (1996) and Fidora, Fratzscher and Thimann (2007)) and barriers to

Among the many possible drivers, information asymmetries and behavioural factors are currently deemed pertinent. However, whether corporate disclosure can incentivise investors to allocate capital across borders by reducing information frictions, remains an open question. Some studies suggest that disclosures may mitigate information asymmetries and reduce investors' uncertainty about foreign firms' performance, thereby reducing home bias (Eichler, 2012; Leuz, Lins and Warnock, 2009; Dahlquist et al., 2003; Gelos and Wei, 2005; Aggarwal, Klapper and Wysocki, 2005; Bradshaw, Bushee and Miller, 2004; Ahearne, Griever and Warnock, 2004). In contrast, other studies point out that investors specialise. Even when information asymmetries are small and investors are able to learn about foreign firms at low cost, they decide to specialise in domestic portfolio investments (Lundtofte, 2009; Van Nieuwerburgh and Veldkamp, 2009; Coval and Moskowitz, 1999; Ivkovic and Weisbenner, 2005). As well as information frictions, the literature points to behavioural biases and investor preferences to explain domestic and local preferences (Grinblatt and Keloharju, 2001; Beugelsdijk and Frijns, 2010; Huberman, 2001; Guiso, Sapienza and Zingales, 2009). Since this dissertation aims to contribute to the policy debate on the EU sustainable finance framework, the focus throughout is primarily on information asymmetries as a potential mechanism.

Second, while research on ESG disclosures has expanded rapidly in recent years, much of the established literature focuses on financial disclosures rather than ESG disclosures (H. Christensen, Hail and Leuz, 2021). Since ESG disclosures are fundamentally different from financial disclosures, conclusions related to financial disclosures may not be directly transferable to ESG disclosures. In contrast to financial disclosures, which are directly relevant to investors, ESG disclosures can cover a broad range of issues that may or may not feed into investors' considerations to the same extent. In particular, disclosures on firms' impacts on broader social and environmental outcomes (rather than the other way around) may speak to costs and benefits that fall outside investors' time horizons and that are borne by others (Hardin, 1968; Carney, 2015; Schoenmaker and Schramade, 2018). This may be particularly the case in the environmental domain, where the impact of climate change will be felt most by future generations. Therefore, it is not evident that the mechanisms through which financial disclosures impact allocation and cost of capital carry over in the same way

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cross-border investment, such as capital controls, taxation and institutional quality (e.g. Black (1974), Cole and Obstfeld (1991) and P. Martin and Rey (2004)), to information costs and asymmetries (e.g. Ahearne, Griever and Warnock (2004), Coval and Moskowitz (1999), Barron and Ni (2008), Van Nieuwerburgh and Veldkamp (2009), Van Nieuwerburgh and Veldkamp (2010) and Eichler (2012)). Consequently, the term 'home bias' may be somewhat misleading, as deviations from theoretically optimal portfolios can arise from rational responses to investment frictions rather than behavioural bias. Nevertheless, this thesis uses the term 'home bias' in accordance with established convention in the literature.

to ESG disclosures.

Third, most of the current ESG disclosure literature focuses on voluntary disclosures, mirroring prevailing market practice (H. Christensen, Hail and Leuz, 2021; Krueger et al., 2024). In a voluntary setting, firms themselves decide whether or not to disclose. Since firms that choose to provide ESG disclosures may in many ways be different from those who do not, including their performance on ESG aspects, the relationship between ESG disclosures and capital market outcomes for these firms may not hold for a broader population of firms in a mandatory disclosure setting. As an example, firms that otherwise would not provide disclosures may be incentivised to engage in 'boilerplate' reporting – providing standardised disclosures that use many words with little firm-specific content (Brown and Tucker, 2011; H. B. Christensen, Hail and Leuz, 2018), or 'greenwashing' – disclosing to be more green or sustainable than is actually the case (Dumitrescu, Gil-Bazo and F. Zhou, 2022). These behaviours may limit the overall credibility and usefulness of ESG disclosures in a mandatory setting.

Box 1: The EU sustainable finance framework at a glance

Since 2018, the EU has established a comprehensive legislative framework aimed at advancing sustainable finance (European Commission, 2018; European Commission, 2021b). Sustainable finance, known under various names including 'sustainable investing', 'responsible investing', 'green finance', 'impact investing' or 'ESG', has been defined by the European Commission as 'the process of taking due account of environmental and social considerations in investment decision-making, leading to increased investments in longer-term and sustainable activities' (European Commission, 2018; Zukas, 2023). In the course of the last few years, the EU sustainable finance framework has evolved at an unprecedented pace, crystallising into a dense and interwoven set of legislation sometimes referred to as a 'regulatory tsunami' (Zukas, 2023).

Without attempting to be exhaustive, and abstracting from many of the technical details, the EU sustainable finance legislation can be organised in two broad categories. The first category deals with the definition of what counts as sustainable or 'green'. Among the various legislative initiatives in this category, the EU Taxonomy Regulation (Regulation (EU) 2020/852) is the most salient and the first of its kind in the world. The Taxonomy constitutes a mandatory framework to classify economic activities performed in the EU as 'green' or 'environmentally sustainable'. Listed companies and large companies (even if non-listed) must disclose the extent to which their activities qualify as environmentally sustainable in a harmonised way. In addition, the EU Green Bond Standard Regulation (EuGBS, Regulation (EU) 2023/2631)

provides a voluntary framework for issuers who want to use the label 'European Green Bond' (EuGB). If green bond issuers want to use the EuGBS label, they must allocate all net proceeds to activities that meet EU Taxonomy criteria, either by directly financing Taxonomy-aligned assets and expenditures or through eligible financial assets, with a limited flexibility margin of up to 15% for activities that meet general Taxonomy requirements but lack technical screening criteria. Issuers must also publish a pre-issuance factsheet, annual allocation reports and at least one environmental impact report, obtain reviews from supervised external reviewers and issue an EU-Prospectus-compliant document unless exempted.

The second category prescribes what information must be disclosed. The three central initiatives are the Sustainable Finance Disclosure Regulation (SFDR, Regulation (EU) 2019/2088), the Corporate Sustainability Reporting Directive (CSRD, Directive (EU) 2022/2464) and the Corporate Sustainability Due Diligence Directive (CSDDD, Directive (EU) 2024/1760). The SFDR mandates that financial institutions and advisors, including banks, insurers, pension funds and asset managers, explain how they consider sustainability risks, disclose negative environmental and social impacts of their investments and provide disclosures on their products (under Articles 6, 8 or 9) so that investors can easily understand how 'green' these really are (Joint Committee of the European Supervisory Authorities, 2021). The CSRD, which updates the Non-Financial Reporting Directive (NFRD, Directive 2014/95/EU), requires large and listed companies to publish standardised sustainability reports that cover environmental and social impacts and related risks. The CSDDD obliges large companies to identify, prevent and address human rights and environmental harm in their operations and supply chains through a risk-based due diligence process. All three frameworks link to the EU Taxonomy by requiring disclosures on how much of a company's activities or investments align with the Taxonomy's criteria for environmentally sustainable activities. The CSRD also provides company-level data needed for SFDR reporting, which helps financial institutions report more accurately on how their investments affect people and the environment.

These legislative initiatives seem largely driven by the EU's premise that information asymmetries in sustainability-related information are widespread (see e.g. SFDR Recitals 8 and 10) and that they hamper allocation of capital to green investments and proper pricing of sustainability risks. By standardising and mandating ESG-related disclosures, the EU sustainable finance framework aims to reduce sustainability-related information asymmetries through improved transparency, comparability and credibility. The disclosure requirements are intended to not only inform investors about how environmental and social risk factors affect firms' financial performance (the 'outside-in' perspective, often referred to as 'single materiality'), but also to shed light on how firms' activities affect environmental and social outcomes (the 'inside-out' perspective, i.e. 'double materiality') (Zukas, 2023; Shami, 2023). Moreover, the EU views the sustainable finance legislation and capital market integration initiatives, formerly known as

the Capital Markets Union and now known as the Savings and Investment Union, as mutually reinforcing strategies to facilitate cross-border investment to support the EU economy and the EU's policy priorities (European Commission, 2021b).

However, despite or perhaps because of its ambitious goals, EU sustainable finance legislation has faced growing criticism since 2024, amid geopolitical developments and the need to balance sustainability objectives with global competitiveness and adaptability (Draghi, 2024). In response, previously adopted legislation has been paused or steered towards simplification and proportionality through the Sustainable Finance Omnibus Packages (Directive (EU) 2025/794; Directive (EU) 2026/470). At a high level, the EU's 'stop-the-clock' Omnibus (Directive (EU) 2025/794) delays parts of the framework's phase-in to prevent firms from incurring avoidable compliance costs during the simplification reforms. Under the CSRD, the reporting requirement for the largest companies that already reported in 2025 remains unchanged. However, mandatory sustainability reporting for other large companies is deferred by two years, requiring them to report from 2027 onwards, provided they meet the new scoping criteria. Listed small and medium-sized enterprises, which were scheduled to begin reporting from 2028 onwards in the 'stop-the-clock' Omnibus proposal, have since been removed from the reporting scope as part of the simplification efforts. Under the CSDDD, the 'stop-the-clock' Omnibus grants an additional year both for national transposition, from mid-2026 to mid-2027, and for the first application of due-diligence obligations for the largest in-scope companies, from mid-2027 to mid-2028. The 'simplification' Omnibus Package (Directive (EU) 2026/470) amends the scope of the CSRD and CSDDD to refocus on the largest firms and shield smaller firms: CSRD reporting is limited mainly to firms exceeding high turnover and employee thresholds and information requests to smaller value-chain firms are capped. The CSDDD amendments raise the scope thresholds so that due-diligence duties apply mainly to very large companies, shift compliance further towards a risk-based approach, tighten limits on information requests directed at smaller firms, narrow stakeholder-engagement requirements and remove the climate transition plan requirement. In sum, these developments underscore that the policy debate on sustainable finance regulation remains in flux, creating an opportunity for academics to assess the legislation's effects and feed evidence back into ongoing discourse on policy design.

1.2 Research questions and dissertation outline

Collectively, the introduction of the ambitious EU sustainable finance framework and the gap in the literature on the relation between ESG disclosures and capital market outcomes

motivate this dissertation. Specifically, this dissertation aims to contribute to answering the following motivating research question: *Can ESG disclosures, whether voluntary or mandatory, reduce information asymmetries in a way that materially affects (cross-border) allocation and cost of capital for green investments in the EU?*

To contribute to answering this motivating question, this dissertation assembles three self-contained studies presented in Chapters 2 through 4, organised in two parts (see Annex 5.4 for an overview). Part I, spanning Chapters 2 and 3, focuses on developments in capital market integration and the role of voluntary ESG disclosures in euro area green bond markets. The aim is twofold: first, to assess whether investors, particularly those with higher sustainability ambitions, are willing to invest cross-border in emerging and largely unregulated markets where information asymmetries are likely to play a role; and second, to examine whether the adoption of a voluntary ESG disclosure standard is associated with the ability of firms to attract foreign investors to their green bond issuances. Part II, consisting of Chapter 4, takes a broader perspective by synthesising empirical evidence on how voluntary or mandatory ESG disclosures relate to the allocation and cost of capital for green investments in the EU. Taken together, these three studies help uncover potential market frictions that may hinder the efficient allocation and pricing of capital to support the green transition, and assess whether existing evidence supports the intended capital market channels of the EU sustainable finance legislation. Finally, Chapter 5 concludes by synthesising the main findings of the dissertation and reflecting on the motivating research question, discussing methodological limitations and identifying avenues for future research and policy implications.

Part I – Capital market integration and voluntary ESG disclosures in emerging euro area green bond markets

Part I focuses on developments in cross-border capital allocation and the role of voluntary ESG disclosures in emerging and largely unregulated euro area green bond markets. The objective of the EU sustainable finance framework is to reduce information asymmetries by improving the transparency, comparability and credibility of ESG disclosures, partly to facilitate *cross-border* investment in green projects. An improved information environment, however, does not automatically lead to more cross-border investment since investors must also be willing to act on information about foreign firms. To investigate this, Part I studies the nascent and largely unregulated euro area green bond markets as an empirical case study, exploiting the likely salience of supply constraints and information asymmetries. Green bonds are a relatively new debt instrument and are similar to conventional corporate or government bonds, except that their proceeds are earmarked for projects with environmental benefits (J. C. Reboredo, 2018).

Because the emerging green bond markets lacked harmonised rules on green definitions, use of proceeds and reporting, investors likely faced substantial information asymmetries. Since green bond market development was furthermore heterogenous across euro area countries,[3] investors keen to invest in green bonds had to familiarise themselves with foreign markets when domestic green bonds were scarce or not available. This institutional setting lends itself particularly well to exploring whether investors who had acquired knowledge about foreign firms by investing abroad continue making optimal use of this information when their domestic market grows. In addition, this context is well suited to explore the role of firms' voluntary ESG disclosures in attracting foreign investors to their green bonds.

Chapter 2 exploits the dynamics surrounding the gradual development of euro area green bond markets to disentangle supply and demand. It addresses the research question of whether investors who acquired knowledge about foreign markets by investing abroad, due to a scarce or absent domestic market, favour their domestic market once it becomes available. Motivated by evidence that green bond home bias was lower than conventional bond home bias in the early stages of market development, the chapter examines whether this pattern reflects domestic supply constraints, investors' intrinsic preferences for green investment products or a combination of both. In line with the existing home bias literature, the chapter formulates the hypothesis that a lack of domestic green bond supply forces investors, who would otherwise prefer domestic bonds, to invest across borders. If domestic supply constraints are an important driver, investors whose green bond portfolios initially consist entirely of foreign bonds are expected to shift towards domestic green bonds once these become available, with home bias increasing further as domestic green bond markets deepen. The chapter thus provides insight into whether home bias emerges even when investors have already acquired information about foreign markets through prior investment. The chapter furthermore explores whether investors' sustainability ambitions help explain the initially lower levels of home bias observed in green bond markets relative to conventional bond markets, by examining whether banks that adopt a voluntary ESG disclosure standard are more inclined to invest in green bonds abroad, and whether their green bond portfolios therefore exhibit lower levels of home bias than those of non-adopting banks.

Chapter 3 subsequently exploits the emerging and largely unregulated green bond market and the introduction of a new voluntary ESG disclosure standard to address the research question of whether firms that adopt this standard are able to attract more foreign investors to

[3]The data used in this dissertation show a growth of the euro area green bond market across all euro area countries from EUR 2.78 billion in Q1 2014 to EUR 452.64 billion in Q1 2022. This amounts to 3% of the conventional bond market in the euro area in Q1 2022. France, Germany, Italy and the Netherlands had developed corporate green bond markets by mid-2014. The number of euro area countries with a green bond market increased to nine in 2016, 11 in 2017 and 17 by mid-2021.

the green bonds they issue, as measured by the level of investor home bias observed for these green bonds. Firms adopting the voluntary ESG disclosure standard commit to providing climate-related financial disclosures that are intended to be useful to investors by integrating forward-looking information on how climate-related risks and opportunities affect the firm's financial position and future performance. Given that information frictions are likely to be salient in emerging and largely unregulated green bond markets, the chapter formulates the hypothesis that adoption of the disclosure standard can reduce investors' uncertainty regarding how climate risks affect firms' financial positions and future performance, thereby facilitating cross-border investment and lower levels of home bias for the green bonds they issue. Since firms themselves decide whether and when to adopt the disclosure standard, disentangling the effect of disclosures from other factors is challenging. Chapter 3 therefore employs several complementary approaches, each with their own strengths and limitations, to establish whether a consistent link appears between the adoption of a voluntary climate-related financial disclosure standard and home bias.

Part II - Emerging evidence on the impact of EU sustainable finance legislation on the allocation and cost of capital for green investments in the EU

Chapter 4 takes a broader perspective and synthesises the emerging empirical evidence on the relation between ESG disclosures and capital market outcomes for green investments within the EU, addressing the research question of what evidence exists on the effects of voluntary and mandatory ESG disclosures on the allocation and cost of private capital for green investments. The chapter considers evidence on both voluntary ESG disclosure initiatives observed in the EU, such as the adoption of international disclosure standards by EU firms, and mandatory ESG disclosure requirements introduced under the EU sustainable finance legislative framework. The synthesis is organised along three dimensions – population, intervention and outcomes – and is supplemented by a discussion of the underlying mechanisms proposed in the literature. First, the population dimension encompasses the actors operating in EU financial markets, specifically the financial institutions that supply capital and the non-financial institutions or financial institutions that seek capital for green projects or activities. Second, the intervention dimension distinguishes between voluntary and mandatory ESG disclosures, with the latter referring to disclosure obligations introduced through EU sustainable finance legislation. Third, the outcomes dimension reviews evidence on two central outcomes of interest: the allocation of capital to green investment projects and the cost of capital for such investments. By structuring the review along these dimensions, the chapter identifies what is currently

known, highlights gaps and limitations in the empirical literature, and discusses implications for future research and the ongoing policy debate on sustainable finance regulation in the EU. In doing so, it complements the insights gained in Chapters 2 and 3 on developments in cross-border capital allocation and the role of voluntary disclosures in a specific market segment with broader evidence on the relation between voluntary and mandatory ESG disclosures and the allocation and cost of capital for green investments across EU markets, and by taking stock of the emerging evidence on EU sustainable finance legislation.

1.3 Methodology

This dissertation uses a combination of empirical analyses in Chapters 2 and 3 and a systematic literature review in Chapter 4 to obtain its results. This section provides a brief overview of the data and methods used in each chapter. Please refer to Annex I for a high-level chapter overview that documents the research questions, main data sources and methods, together with details on co-authorship, individual contributions and other contributors to the research. Detailed descriptions of the data sources, variable definitions and methodological strategies are provided in the respective chapters. Annex II contains additional information on data management. Chapter 5 revisits the methodological choices by discussing their limitations and outlining avenues for future research.

Chapter 2 first examines whether domestic green bond supply constraints can help explain the evolution of investor home bias in euro area green bond portfolios. The analysis uses confidential Eurosystem bond-level holdings data for euro area investors between Q4 2013 and Q3 2021. Investor holdings are aggregated at the 'investor country' level; that is, by the country of residence of the investor. Two-way fixed-effects panel regressions are applied at this level to estimate the relationship between green bond home bias and domestic green bond market development. The empirical specification controls for unobserved country-specific characteristics, such as tax regimes, and also controls for common temporal shocks, including for example monetary policy, macroeconomic conditions and the Covid-19 pandemic, through the inclusion of fixed effects. Models are estimated for all investors and separately for banks. Standard errors are clustered at the 'investor country' level to allow for serial correlation of observation within countries. The empirical strategy focuses on changes over time in the relative size of domestic green bond markets, measured against a country's overall bond market. To distinguish the initial emergence of a domestic green bond market from its subsequent expansion, the study combines unweighted regressions with specifications weighted by countries' shares in the euro area green bond market. This approach allows the

analysis to capture both potential 'jump' effects when domestic supply first becomes available and further increases in home bias as markets deepen.

The second part of Chapter 2 examines whether investors' sustainability ambitions are associated with differences in cross-border green bond investment patterns. This analysis focuses on large euro area banks and uses confidential Eurosystem quarterly bank-level green bond holdings between Q3 2018 and Q3 2021. Sustainability ambition is proxied by a dummy variable indicating a bank's adoption status of a voluntary international climate-related disclosure standard. Fixed-effects models are employed to examine how banks' green bond home bias relates to disclosure adoption and domestic green bond market development. The specification controls for time-varying bank fundamentals, bank fixed effects – which capture time-invariant differences such as business model heterogeneity – and time fixed effects. Standard errors are clustered at the banking-group level. To distinguish the effect of the initial establishment of a domestic green bond market from its subsequent development, the models are estimated for two subsamples. The first subsample includes banks located in countries that already have a domestic green bond market. The second subsample includes all banks, including those in countries that initially lack a domestic green bond market, where potential jump effects can be observed as markets emerge.

Chapter 3 investigates investor home bias at the level of individual corporate green bonds and examines whether issuers' adoption of a voluntary climate-related financial disclosure standard is associated with differences in investor home bias. The analysis relies on the same confidential bond-level holdings database as Chapter 2 and covers 859 green bonds issued between Q1 2014 and Q1 2022 by 244 firms across 17 euro area countries. Cross-sectional regressions are employed to obtain initial insights into how issuers' disclosure adoption status relates to green bond home bias. The specifications include a range of control variables to account for the possibility that firm characteristics and country-level factors affect this relationship. The models are also estimated on subsamples, distinguishing between low- and high-risk bonds and between bonds issued by the three largest green bond issuing countries and those issued elsewhere.

To better disentangle the role of climate-related disclosure from that of confounding factors, the study applies two additional estimation approaches: two-way fixed-effects models and an event study design based on a matched sample of green bond issuing firms. Relative to cross-sectional analysis, the two-way fixed-effects approach allows the analysis to control for time-invariant bond, issuer and issuer-country characteristics, as well as for common temporal shocks. To further account for time-varying confounding factors, the baseline specification is extended to include observable issuer- and country-level characteristics. The models are estimated under alternative error structures and for both the full sample of green

bonds and subsamples distinguishing between the largest green bond issuing countries and others. In addition, to mitigate self-selection concerns, the study constructs a matched sample of green bond issuing firms with similar observable characteristics and estimates an event study model around the quarter in which firms adopt the disclosure standard. Together, these approaches exploit both cross-sectional and within-issuer variation to assess how climate-related disclosures relate to investor home bias in green bond markets.

Chapter 4 adopts a structured and systematic rapid review methodology to synthesise the emerging empirical evidence on the impact of mandatory ESG disclosures under the EU sustainable finance framework on capital markets. In light of the EU's rapidly evolving sustainable finance framework, a rapid review method is particularly suited to inform the current and future regulatory and policy debate. The review is based on literature identified via three academic databases: Scopus, Web of Science and EconLit. Scopus and Web of Science are widely used databases and provide broad, multidisciplinary coverage. The academic database search is supplemented with grey literature from the European Central Bank and the European Supervisory Authorities. Given their mandates, these authorities are highly likely to have produced analytical work relevant to the research questions. Because of their access to proprietary supervisory data, these grey literature sources are expected to form a valuable complement to the academic literature. The search strategy was organised around the relevant population, intervention and outcomes of interest. The subsequent identification and screening stages yielded 99 included publications, 17 of which are grey literature, published between 2010 and 2025. These were complemented by a targeted search for literature on underlying mechanisms.

1.4 Contribution

This dissertation contributes to the economics and finance literature in three main ways, each directly linked to gaps identified in Section 1.1. First, it offers a novel perspective on the relation between corporate disclosures and capital market outcomes, with a particular focus on cross-border capital allocation, or home bias, an area where existing evidence remains mixed. Chapter 2 contributes by exploiting the scarcity of a financial instrument to document investors' preferences for domestic assets, even when they have already acquired information about foreign assets, and by examining investor sustainability ambitions as a potential behavioural driver of cross-border capital allocation. Second, Chapter 3 adds to the still limited but rapidly expanding literature on ESG disclosures by examining whether firms that adopt a voluntary ESG disclosure standard are able to attract more foreign investors to the green bonds they issue. In doing so, it complements the large body of evidence on

financial disclosures and speaks to the limited transferability of insights from financial to ESG disclosure settings highlighted in the literature. Finally, Chapter 4 synthesises the existing empirical evidence on the relation between voluntary and mandatory ESG disclosures and the allocation and cost of capital for green investment projects within the EU, thereby addressing the relative scarcity of evidence on mandatory disclosure regimes. By identifying patterns, gaps and limitations in the current literature, the chapter provides a structured overview of what is known and where evidence remains inconclusive. Collectively, the studies in this dissertation may also provide relevant input for policymakers and regulators involved in the ongoing calibration of the EU sustainable finance framework.

Part I

Capital market integration and voluntary ESG disclosures in emerging euro area green bond markets

Chapter 2

Green bond home bias and the role of supply and sustainability preferences

Abstract Using nascent euro area green bond markets as an experimental set-up, we are able to show that home bias is a universal phenomenon. Exploiting dynamics around the scarcity of an asset class, we show that investors tend to turn to their domestic market as soon as their home market becomes available. Moreover, investors' home bias slowly increases further as the domestic market develops, even if these investors have previously acquired sufficient information about the non-domestic market through investing abroad first. Using confidential bond-level holdings data of euro area investors between Q4 2013 and Q3 2021 in combination with green bond labels, we document that home bias in the euro area bond market is currently lower than in conventional bond markets. Green bond home bias increases over time, however, as investors revert back to their home market as soon as (more) green bonds become available domestically. Moreover, banks' sustainability ambition drives cross-border green bond investments, although the results are heterogeneous across countries and the beneficial impact of banks' sustainability ambition on green bond home bias dissipates quickly once banks' domestic green bond market grows.

2.1 Introduction

Investors' bias towards holding domestic financial assets, or home bias, has been extensively researched but remains an important empirical puzzle in financial markets to date. Since the 1980s, a growing field of literature has proposed several partly competing and partly complementary explanations for investors' home bias. These explanations range from deviations from purchasing power parity (see e.g. Adler and Dumas (1983), Cooper and Kaplanis (1994), Lewis (1996) and Fidora, Fratzscher and Thimann (2007)), barriers to trade such as capital controls, taxes and institutional quality (see e.g. Black (1974), Cole and Obstfeld (1991) and P. Martin and Rey (2004)) and information costs and asymmetries (see e.g. Ahearne, Griever and Warnock (2004), Coval and Moskowitz (1999), Barron and Ni (2008), Van Nieuwerburgh and Veldkamp (2009), Van Nieuwerburgh and Veldkamp (2010) and Eichler (2012)) to behavioural characteristics (see e.g. Pradkhan (2016), Anderson et al. (2011) and Beugelsdijk and Frijns (2010)). Only a few studies have looked at the role of supply in driving international cross-border lending (see e.g. Cerutti and Claessens (2017), Giannetti and Laeven (2012b) and Giannetti and Laeven (2012a)) and its effects on home bias in capital allocation. These papers typically use adverse economic shocks/financial crises to disentangle supply from demand to establish that lenders rebalance their loan portfolios in favour of domestic borrowers following a crisis. These papers provide insights specifically for banks, but little is known about how overall market supply affects home bias.

Nascent and slowly developing markets are an ideal set-up to assess how the limited and gradually evolving supply of an asset class affects cross-border investment decisions and ultimately country-level home bias. Using the euro area green bond market, a market that is gradually evolving, we explore how home bias develops over time. More specifically, by exploiting dynamics around this gradual development we are able to disentangle supply from demand and tease out whether investors keen to invest in green assets abroad in a scarce or absent domestic market favour their domestic market once it becomes available. This paper thus contributes to the literature by exploiting the scarcity of an asset class to understand how home bias develops from a dynamic perspective. Hence, we are able to provide insights into whether home bias is a universal phenomenon that evolves even when investors have accumulated sufficient information about their non-domestic market through investing abroad first. To our knowledge, the direct effect of supply constraints on home bias has not yet been studied. In addition, our paper provides important insights into the overall integration of the euro area green bond market and its drivers, which is virtually unexplored, despite its relevance for the transition to a sustainable economy. This is surprising in and of itself, but even more so when considering that home bias in the euro area green bond market is currently

lower than in conventional bond markets in all countries across Europe (see Figure 2.1).

To this end, this paper first compares the development of home bias in the green bond market against the aggregate bond market over time, first considering all investors and subsequently focusing on the euro area banking sector as a whole and the largest banking groups separately. Second, we assess the relation between euro area green bond supply and euro area green bond (portfolio) home bias for different euro area investors. Our goal is to understand whether lower home bias in green bond markets is driven by the lack of domestic green bond supply stemming from the early stages of development of these markets. Finally, zooming in on the largest banking groups, we investigate whether investors' sustainability ambition could in part explain lower levels of green bond home bias.

We are able to explore these questions using confidential data on individual security-by-security holdings of euro area investors, which we can track over time. More specifically, the dataset contains quarterly bond holdings of euro area investors at the country-sector level and banking group level, which we augment with green bond label data as well as granular bank level information.

We document that euro area investors have a significantly lower level of home bias in their green bond portfolios compared to their conventional bond portfolios. However, we observe an increase in green bond home bias over time, implying that green bond markets are becoming less integrated as they mature. This observation is corroborated by the results of our regression analysis, which captures the immediate effects of direct green bond market development as well as the gradual effects as domestic green bond markets develop further over time. In the aggregate across all euro area investors, we find that investors who only hold foreign green bonds in the absence of a domestic green bond market shift their portfolios towards domestic bonds as soon as green bonds become available in their home country. After this initial correction, home bias slowly increases further as the domestic market develops, suggesting that the overall positive integration of green bond markets gradually diminishes. Similar to our findings across all investors, euro area banking sectors turn to their domestic green bond markets once these become available in their home country. However, after this initial jump effect, the further development of the domestic green bond market does not seem to affect their bias towards domestic green bonds. Finally, our regression analysis shows that an increase in large banks' sustainability ambition drives cross-border green bond investments and lowers the level of home bias. However, the beneficial impact of banks' sustainability ambition on green bond home bias seems to dissipate quickly as banks rebalance their portfolio towards domestic green bonds as their home market grows.

Our research contributes to different strands of literature. First and foremost, our analysis reaffirms the existence of home bias as a universal phenomenon given that home bias also

develops in initially well integrated nascent markets over time (as soon as a domestic market develops). At least since French and Poterba's 1991 seminal paper, investors' preference to buy domestic financial assets is known as home bias. Many papers have established this relation since (for an overview see e.g. Coeurdacier and Rey (2013)). We add to this literature by assessing the role of supply constraints. Second, we contribute to the literature that provides explanations for why investors reveal a preference for their home countries' assets. Establishing the sustainability ambition of banks as a determinant, we particularly add to the literature that focuses on investors' behavioural characteristics as drivers of home bias (see e.g. Pradkhan (2016), Anderson et al. (2011) and Beugelsdijk and Frijns (2010)). Third, the results of this paper more generally contribute to studies that aim to disentangle the effect of supply and demand in cross-border financial investment decisions, which have so far exploited crises to distinguish supply from demand (see e.g. Cerutti and Claessens (2017), Giannetti and Laeven (2012b) and Giannetti and Laeven (2012a)).

From a policy perspective, our results are more directly related to the discussion whether financing the climate transition could help advance financial integration should green capital markets deepen further (Born et al., 2021), which is also linked to economies' limitations in financing large innovations (see e.g. Sorensen et al. (2007)).[1] Arguably, the transition to a sustainable economy is the largest innovation challenge faced by society today. It is also one that requires substantial investments. Making Europe climate neutral by 2050 is expected to require at least EUR 1 trillion of investments in the upcoming decade (European Commission, 2021b). While the European Union (EU) has set up various public funding initiatives, private sector involvement is deemed crucial by policymakers and regulators to meet the EU's goals. Hence, the European green bond market could play an important role in financing the transition to a sustainable economy.

The paper proceeds as follows. Section 2.2 describes the data used for this study and discusses variable construction. Section 2.3 provides an overview of the development of the euro area green bond market and compares home bias in green and conventional bond markets. Section 2.4 shows the results of our regression analysis on the relation between green bond supply constraints and investors' green bond home bias. Section 2.5 provides the results of our regression analysis on the relation between banks' sustainability ambition and their green bond portfolio home bias, and Section 2.6 concludes.

[1] It has been argued that home bias leads to suboptimal levels of capital market integration and risk sharing, making countries more vulnerable to idiosyncratic crises and less able to finance large innovations.

2.2 Data and variable description

2.2.1 Data

Our analysis is based on the Securities Holdings Statistics (SHS) from the European System of Central Banks (ESCB). This unique and confidential database contains detailed information on the holdings of long-term (maturity > 1 year) debt securities by euro area residents, reported on a quarterly basis. Each observation in the database corresponds to an ownership position in a security identified by the security's unique International Security Identification Number (ISIN). There are two versions of the Securities Holdings Statistics. The first version reports bond-level ownership positions at the country-sector level. This means that we can observe, for instance, the German banking system's holdings of a particular Dutch government bond in a given quarter. The second version of the Securities Holdings Statistics contains bond-level ownership positions at the bank level, for the largest euro area banking groups.[2] The data are available at the bank entity level.[3] For the purpose of our analysis, we aggregate the data at group level. We exclude intragroup holdings in order to exclude bonds that are used for financing or liquidity purposes, rather than portfolio investment purposes. Our data sample begins in Q4 2013, when the ESCB first started collecting the data, and ends in Q3 2021. We restrict our dataset to holdings of euro denominated bonds that are issued by euro area entities. We do so because we want to focus our analysis on home bias and green bond market integration in the euro area.

To identify green bonds, we complement our Securities Holdings Statistics datasets with Bloomberg's green bond label data. Bloomberg established its green bond database in 2014, which has coverage dating back to the inception of the global green bond market in 2007. In the database, a bond is labelled a 'green bond' when an issuer self-proclaims the bond as 'green' in its issuance documentation and/or in official public communications that state that 100% of use of proceeds needs to be dedicated to green activities as categorised by the Green Bond Principles established by the International Capital Market Association (International Capital Markets Association, 2022). However, Bloomberg does not require any additional reporting on the management and use of proceeds, nor assurance from an external provider (GBP SBP Databases and Indices Working Group, 2018).

Finally, we complement our bank-level Securities Holdings Statistics dataset with additional information on the banks in our sample. First and foremost, we add information on whether

[2] Until Q2 2018, the banking data contains information on bond holdings for the 26 largest banking groups with a head office in the euro area. Between Q3 2018 and Q3 2020, the number of banking groups in the sample increased to 126, comprising all significant banking groups under direct ECB supervision.

[3] This means that holdings of all subsidiaries and branches within and outside the euro area are observed.

and when the banks in our sample became a supporter of the Financial Stability Board's (FSB) industry-led Task Force on Climate-related Financial Disclosures (TCFD). The FSB TCFD has developed recommendations for more effective climate-related disclosures that could promote more informed investment decisions and enable market participants to better understand and assess climate-related risks (Financial Stability Board Task Force on Climate-related Financial Disclosures, 2017). We use this information to create an indicator that proxies the banks' sustainability ambition. Second, we augment our dataset with banks' core equity Tier 1 and return on average equity data as controls. We retrieve these data from Bureau van Dijk's Bankfocus database.

2.2.2 Variable description

Table 2.1 provides a comprehensive overview and description of the variables we use for our analysis. To assess whether the degree of integration in the green bond market differs from that in the non-green bond market, we first compare home bias in the green to non-green bonds. In line with the literature (e.g Ahearne, Griever and Warnock (2004), Baele, Pungulescu and Ter Horst (2007) and Fidora, Fratzscher and Thimann (2007)), we measure home bias as the degree to which investors overweigh domestic bonds, and underweigh foreign bonds, relative to a benchmark portfolio that would weigh home and foreign (i.e. other euro area) bonds according to their respective shares in the aggregate (euro area) bond market.[4] We estimate the following measure separately for the green and non-green bond market:

$$HB_{it} = 1 - \frac{HS_{it}^{For}}{HS_{it}^{For,Optimal}} \tag{2.1}$$

In Eq. 2.1, HB_{it} represents the home bias in investor i's bond portfolio at time t. HS_{it}^{For} represents the investor's actual foreign bond holdings as a share of their total bond holdings. $HS_{it}^{For,Optimal}$ represents the optimal foreign holdings share of investor i at time t, which is merely computed as the outstanding amount of bonds issued by the investor's country of domicile, relative to the total outstanding amount of bonds issued by all euro area countries. We use different levels of aggregation throughout our analysis. This means that 'investor'

[4]The choice for this measure of home bias is motivated by its clear and straightforward economic interpretation, which derives directly from mainstream finance theory (the Capital Asset Pricing Model). In addition, this measure is used in a substantial part of the existing home bias literature, such that results in this paper can be easily compared to the existing literature. It should be noted, however, that the conventional home bias measure has been found to yield biased results under certain circumstances, for instance in the case of very large or small optimal portfolio weights (see e.g. Cooper, Sercu, Vanpee et al. (2013)). Since we focus our analysis on euro denominated bonds issued by euro area entities only, we mitigate this issue to a large extent as we do not observe extreme outliers in terms of portfolio weights.

can refer to either all investors, the banking sector or individual banking groups in a certain country. When our home bias measure is equal to 1, a country's investors exclusively hold domestic bonds (maximum home bias). When the measure is equal to 0, the portfolio is optimally diversified. Values smaller than 0 indicate a foreign bias.[5]

The aim of our study is to compare home bias in the euro area green bond market against the traditional bond market and to document possible drivers of green home bias, focusing on supply constraints and sustainability preferences as two main driving factors. To this end, we construct the following main explanatory variables. First, $DomesticDevelopment$ represents an investor country's green bond market development measured by the outstanding amount of green bonds issued by that country as a percentage of the overall outstanding amount of bonds issued (both green and non-green bonds). Second, to assess whether the relation between $DomesticDevelopment$ and green bond home bias differs between countries with a well developed versus less developed domestic green bond market, we construct a variable $GreenMarketShare$, which represents a country's total amount of green bonds issued as a percentage of the total amount outstanding of green bonds issued in the euro area. We use this variable as a weighting factor in our regression analysis. Third, for our study of the relation between investors' sustainability ambition and green bond home bias, we zoom in on the behaviour of the largest euro area banking groups. We proxy banks' sustainability ambition by means of a dummy indicator, $ClimateDisclosure$. This variable indicates whether a bank is a supporter of the FSB's TCFD. When a bank becomes a supporter, the bank commits itself to publishing information on its climate risks and opportunities in line with the TCFD's recommendations. Although this is not a direct measure of a banks' sustainability ambition, given that banks self-select to become a TCFD supporter, we consider this a signal of their sustainability goals and in turn are able to test whether supporting the TFCD is credible. Specifically, we hypothesise that the banks that deem climate risks relevant and urgent are also the banks that are frontrunners in addressing these risks and see merit in disclosing climate risks and opportunities. This hypothesis seems to be supported by the FSB, which acknowledges that when the TCFD recommendations were released in 2017, few organisations accepted climate change as a major financial risk. Only in its status report dated September 2021, which coincides with the latest period in our data sample, does the FSB argue that the TCFD recommendations have become the market standard (Financial Stability Board Task Force on Climate-related Financial Disclosures (2021)). Since our data sample matches the early years of the TCFD initiative, we find it reasonable to assume that

[5] By construction, it is possible that our home bias measure takes on large negative values. This is the case when investors have a strong foreign bias in their bond portfolios. Such distributional properties may complicate any empirical analysis. However, we do not observe such outliers in our data.

the supporters are frontrunners in terms of sustainability ambition. Since we observe bond holdings and home bias for all large euro area banks, regardless of whether the banks are a TCFD supporter or not, our analysis does not suffer from self-selection bias.

Table 2.1: Variable description

This table lists variables used throughout the analyses and provides an overview of the data sources used, data frequency and definition of the variables.

Variable name	**Data source**	**Frequency**	**Description**
		All euro area investors and banking sectors	
Home bias	SHS, Bloomberg	Quarterly	**Home bias** in a country-sector's bond portfolio. For the purpose of our analysis, we focus on a country-sector's holdings of bonds that are issued in the euro area and denominated in EUR.
		All euro area investors, banking sectors and banking groups	
Domestic Development	SHS, Bloomberg	Quarterly	**Domestic Development** measures a country's green bond market development as expressed by the outstanding amount of green bonds issued by that country as a fraction of the overall bonds issued in terms of outstanding amounts.
Green Market Share	SHS, Bloomberg	Quarterly	**Green Market Share** measures a country's total amount of green bonds issued as a percentage of the total amount outstanding of green bonds issued in the euro area.
		Banking groups	
Home bias	SHS, Bloomberg	Quarterly	**Home bias** in a banking group's bond portfolio, as detailed in Section 2.2.2. For the analysis in our paper, we focus on a bank's holdings of bonds that are issued in the euro area and denominated in EUR. For the construction of a banking group's bond portfolio at group level, we aggregate holdings for all entities belonging to the banking group, while excluding intragroup holdings.
Climate Disclosure	Financial Stability Board	Quarterly	**Climate Disclosure** is a dummy indicator signalling whether a banking group was a supporter of the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD) in quarter t.
CET1 Ratio	BvD Bankfocus [85360]	Annually	**Common equity tier 1** as a percentage of risk-weighted assets on a transitional basis as reported by the bank. CET1 on a fully loaded basis is provided in case transitional is not reported.
ROAE	BvD Bankfocus [99480]	Annually	**Return on average equity** measures net income as a percentage of average total equity. Average total equity excludes hybrid capital.

2.3 The euro area green bond market

This section first provides an overview of the development of the euro area green bond market. Second, it compares levels of integration between euro area investors' green and non-green bond portfolios over time.

2.3.1 Developments in the euro area green bond market

This subsection provides an overview of the development of the euro area green bond market. Three features stand out. First, the euro area green bond market has grown markedly since its inception in 2007. Our data sample shows an increase in the outstanding amount of green bonds issued in the euro area from EUR 2.03 billion in Q4 2013 (EUR 2.78 billion Q1 2014) to EUR 420.27 billion in Q3 2021. Green bonds are predominantly issued by banks, non-financial corporations and governments. In Q3 2021, these sectors had issued a total outstanding amount of EUR 123.16, 118.68 and 114.77 billion respectively, accounting for 85% of the market. While the growth of the euro area green bond market is substantial, its size remains small compared to the overall euro area bond market. The outstanding amount of green bonds stood at 0.01% of the overall bond market in Q4 2013 and 2.3% in Q3 2021.[6]

Second, our data indicate that the extent of green bond market development differs substantially across euro area countries. France, the Netherlands and Germany are the largest green bond issuers, with an outstanding amount of EUR 124.75, 73.80 and 68.23 billion respectively in Q3 2021. Together, these top three issuer countries accounted for 38% of the market in Q3 2021. According to our available data, Germany and France had developed a green bond market by Q1 2014, the Netherlands and Italy by Q2 2014, and Spain by Q3 2014. Malta and Cyprus had not developed a green bond market according to our data, retrieved in January 2022. The countries that invest most in euro area green bonds are France, Germany and Luxembourg,[7] who held 20%, 14% and 11% respectively of the outstanding amount in Q3 2021. These countries accounted for 26%, 19% and 15% of total investments in euro area green bonds by euro area investors.

Third, investment funds, insurance companies and banks are substantial green bond

[6] Since green bond data providers use varying definitions for 'green', statistics on the overall size of the euro area green bond market will vary depending on the data provider and definitions used. Our statistics on the size of the euro area green bond market should therefore be considered as indicative only. Nevertheless, our data seem to be broadly consistent with estimates provided by other sources (see e.g. Climate Bonds Initiative (2021)).

[7] For Luxembourg, this does not imply that investors are from Luxembourg, given the large investment funds sector in Luxembourg. Many investments are indirect through funds with investors originating from other countries.

investors, holding 38%, 31% and 18% of the outstanding volume in Q3 2021. Across all euro area investors, we observe that the maturity profile of investors' green bond portfolio is fairly similar to that of their non-green bond portfolio (see Table 2.2). Naturally, investors' green bond portfolios on average contain fewer bonds than their normal bond portfolios. Due to the structure of the green bond market, the share of government bonds in investors' green portfolios is smaller than in their normal bond portfolios. Compared to other investors, banks on average have a larger share of government bonds in their portfolios (see Table 2.2 panel II and Table 2.3). This difference is more substantial for the largest banks.

Table 2.2: Descriptive statistics – Bond holdings by euro area investors

This table provides summary statistics on the green bond and non-green bond holdings of euro area investors, both at the aggregate level (across country-sectors) and for the banking sector (across countries). The tables provide details on some key characteristics of the bonds that make up investors' portfolios, i.e. the original and residual maturity of the bonds and the amount outstanding of the bonds in investors' portfolios. Moreover, the table provides information on the number of bonds held by investors, the share of government bonds in their overall bond portfolios and the home bias of the portfolios.

	(1) green		(2) non-green	
	Mean	SD	Mean	SD
I. All euro area investors				
Original maturity (days)	3736.584	4623.925	2963.619	4026.016
Residual maturity (days)	3084.051	4690.335	1784.644	3623.902
Amount outstanding (bond level, in million EUR)	892.2415	1898.855	1612.498	4477.576
Number of bonds held	177.6097	150.543	75641.59	104259.6
Government bond holdings share	0.2138926	0.1728628	0.4376069	0.2238754
II. Banking sector				
Original maturity (days)	3328.202	3633.352	3291.38	3912.367
Residual maturity (days)	2681.247	3710.106	1912.688	3431.65
Amount outstanding (bond level, in million EUR)	851.4168	1611.367	1459.889	4177.722
Number of bonds held	148.5961	131.7758	16008.28	12026.66
Government bond holdings share	0.217098	0.1768169	0.4588221	0.141401

Table 2.3: Descriptive statistics – Bond holdings at the banking group level

This table provides summary statistics on the green bond and non-green bond holdings of the largest euro area banking groups in our sample. Panel I shows summary statistics for our full sample of banks, which starts out with data on 25 banks in Q4 2013 and increases up to 126 banks between Q3 2018 and Q3 2021. Panel II shows the summary statistics for our restricted sample of the 25 largest banks, for which we observe data during the entire length of our time series. The table provides details on some key characteristics of the bonds that make up the portfolio of the banking groups, i.e. the original and residual maturity of the bonds and the amount outstanding of the bonds. Moreover, the table provides information on the number of bonds held, the share of government bonds in the overall bond portfolios and the home bias of the portfolio.

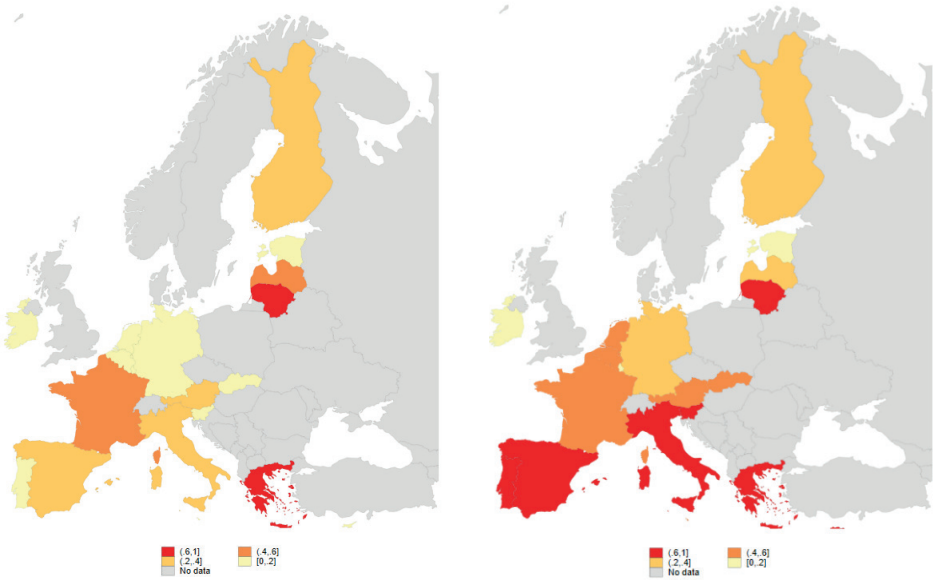
	(1) green		(2) non-green	
	Mean	SD	Mean	SD
	I. All banking groups			
Original maturity (days)	3336.03	3490.868	4401.991	4368.168
Residual maturity (days)	2653.152	3567.81	2608.675	3943.182
Amount outstanding (bond level, in million EUR)	1059.534	2157.716	2497.689	5577.33
Number of bonds held	48.60635	46.08588	2112.079	1530.679
Government bond holdings share	0.4010068	0.2789339	0.6348422	0.1792184
	II. 25 largest banking groups			
Original maturity (days)	3527.567	3729.103	4548.554	4526.938
Residual maturity (days)	2863.524	3802.908	2741.151	4120.736
Amount outstanding (bond level, in million EUR)	1088.434	2242.027	2372.657	5386.043
Number of bonds held	61.397	49.9385	2488.142	1479.354
Government bond holdings share	0.3982715	0.2565365	0.6283441	0.1631442

2.3.2 Comparison of home bias in the green and non-green bond market

We now turn to our main empirical analysis. In a first step, we assess whether financial integration, as measured by our home bias indicator, significantly differs between euro area investors' green and non-green bond portfolios, and whether this difference is persistent over time.

Figure 2.1 provides a graphical overview of investors' green versus non-green home bias by country of residence in 2021. The figure shows that green bond home bias is lower or equal to non-green bond home bias, suggesting that the euro area green bond market is more integrated. In other words, green bonds issued in the euro area are more likely to be held cross-border by euro area investors than non-green bonds issued in the euro area. The difference between green and non-green bond home bias seems particularly pronounced for countries with a relatively high level of non-green bond home bias.

Figure 2.1: Map of green versus non-green bond home bias in euro area countries



(a) Green bond market (b) Non-green bond market

These maps show a comparison between green bond and non-green bond home bias in 2021 across all investors per euro area country. Darker colours indicate a higher level of home bias. Specifically, countries shaded in red exhibit home bias values between 0.6 and 1.0; those shaded in orange between 0.4 and 0.6; those shaded in light orange between 0.2 and 0.4; and those shaded in yellow between 0 and 0.2.

Tables 2.4 and 2.5 provide more insight into the underlying dynamics of financial integration by providing summary statistics of green and non-green bond home bias over time between 2014 and 2021, across all euro area investors as well as for the banking sectors and largest banking groups.

Our data reveal that the euro area green bond market currently displays a higher degree of financial integration than the conventional bond market. This finding holds true across different types of investors. Table 2.4 shows that across all investors, we observe an average green bond home bias of 0.155 compared to a non-green bond home bias of 0.492 for the period 2014 to 2021. We find similar results when zooming in on the euro area banking sectors. While the level of home bias is generally higher for the banking sectors than for other investor types, the average level of green home bias of 0.243 is substantially lower than that of normal bonds at 0.588. A students' two-sided T-test reveals that green bond home bias is statistically significantly lower at a confidence level of 95%, across all investors as well as the banking sectors. Table 2.5 shows that the results are less pronounced for the largest 25 banking groups, with an average green versus non-green home bias of 0.31 compared to 0.44. Although the difference in home bias is smaller than it is for the aggregate of all investors, green bond home bias for the largest banking groups is still statistically significantly lower than non-green bond home bias at the 5% level.

We also observe that while green bond markets in the euro area are currently more integrated than conventional bond markets, green bond home bias exhibits an upward trend, suggesting that green bond markets are generally becoming less integrated over time. Between 2014 and 2021, average green bond home biased increased from 0.066 to 0.233 across all investors, from 0.196 to 0.331 for the banking sectors, and from 0.197 to 0.385 for the 25 largest banking groups. Notably, for the 25 largest banking groups, the difference between green and non-green bond home bias is no longer statistically significant for the period 2019 to 2021, as the level of green bond home bias converges to and even exceeds levels of the conventional bond market in 2021.

2.4 Green bond home bias and supply considerations

In this section, we investigate whether green bond supply shortages impact green bond home bias. In our analysis, we are interested in whether the low yet increasing levels of investors' home bias in euro area green bond markets are driven by the nascent state of these markets, given investors' general tendency to allocate a disproportionately large share of their wealth to domestic financial assets. In other words, we explore whether a lack of domestic green bond

Table 2.4: Home bias in the green and non-green bond market (all euro area investors)

Panels I and II of this table provides summary statistics for our home bias measure and show whether there is a statistically significant difference in green bond and non-green bond portfolio home bias at the country level (all euro area investors) and for the banking sectors only (banking sectors).

	(1)-(2)	(1) green			(2) non-green			comparison tests (1) vs (2)
	N	Mean	Median	SD	Mean	Median	SD	T-test
I. All Euro area investors								
2014	60	.065	.000	.183	.472	.482	.274	.000
2015	67	.122	.000	.236	.492	.507	.254	.000
2016	76	.116	.000	.239	.507	.528	.24	.000
2017	76	.135	.000	.218	.509	.523	.238	.000
2018	76	.169	.100	.197	.498	.500	.245	.000
2019	76	.186	.138	.206	.486	.470	.236	.000
2020	76	.208	.149	.211	.483	.467	.22	.000
2021	57	.233	.156	.212	.48	.466	.216	.000
Total	564	.155	.046	.218	.492	.497	.239	.000
II. Banking sectors								
2014	37	.196	.000	.343	.561	.594	.301	.000
2015	50	.191	.018	.275	.573	.593	.269	.000
2016	66	.151	.000	.262	.591	.645	.251	.000
2017	68	.223	.086	.269	.611	.627	.237	.000
2018	69	.262	.210	.263	.605	.595	.241	.000
2019	76	.269	.119	.271	.587	.579	.24	.000
2020	76	.289	.216	.266	.584	.586	.234	.000
2021	57	.331	.278	.276	.583	.613	.236	.000
Total	499	.243	.129	.278	.588	.595	.250	.000

Table 2.5: Home bias in the green and non-green bond market (banking groups)

This table provides summary statistics for our home bias measure and shows whether there is a statistically significant difference in green bond and non-green bond portfolio home bias for the largest banking groups, per year between 2014 and 2021 and on average over the entire time series for our full sample of banks, which starts with data on 25 banks in Q4 2013 and increases up to 126 banks between Q3 2018 and Q3 2021. Panel II shows the summary statistics for our restricted sample of the 25 largest banks, for which we observe data during the entire length of our time series.

	(1)-(2)	(1) green			(2) non-green			comparison tests (1) vs (2)
	N	Mean	Median	SD	Mean	Median	SD	T-test
I. All banking groups								
2019	93	.340	.269	.414	.432	.452	.312	.000
2020	93	.372	.335	.395	.413	.433	.313	.004
2021	69	.404	.371	.389	.415	.419	.309	.191
II. 25 largest banking groups								
2014	57	.197	.000	.54	.491	.491	.302	.001
2015	75	.318	.145	.475	.469	.492	.267	.021
2016	84	.245	.000	.494	.456	.455	.273	.001
2017	89	.269	.129	.406	.451	.438	.278	.001
2018	185	.304	.263	.385	.445	.477	.282	.001
2019	315	.357	.407	.324	.421	.449	.294	.068
2020	328	.366	.422	.289	.387	.397	.276	.317
2021	271	.385	.392	.249	.354	.361	.276	.814
Total	1404	.310	.304	.400	.437	.441	.283	.000

supply forces investors to look across borders for green bonds. If domestic green bond supply constraints are indeed the underlying driver of the observed home bias dynamics in euro area green bond markets, we expect that investors whose entire green bond portfolio consists of foreign bonds due to the lack of a domestic green bond market will turn to their home market as soon as domestic green bonds become available. Moreover, we expect investors' green bond home bias to increase further as their domestic green bond market grows.

2.4.1 Methodology

To assess in more detail whether green bond supply constraints could indeed drive lower yet increasing levels of home bias in the green bond markets, we employ a fixed effects panel data model. More specifically, we estimate the following model, which we run separately for the aggregate market, i.e. across all euro area investor types, as well as the euro area banking sector:

$$HB_{it} = \beta_0 + \beta_1 DomesticDevelopment + \beta_2 DomesticDevelopment^2 + \gamma_i + \tau_t + \epsilon_{it} \quad (2.2)$$

The dependent variable HB_{it} represents investor country i's green bond home bias in quarter t. Our main explanatory $DomesticDevelopment$ measures a country's green bond market development expressed by the outstanding amount of green bonds issued by that country as a percentage of the outstanding amount of all bonds issued by that country; an indication of the size of the domestic green bond market relative to the aggregate domestic bond market. We first only consider the direct effect of $DomesticDevelopment$ on investors' green bond home bias in our baseline estimation because we want to isolate the effect of green bond supply. Second, we also include $DomesticDevelopment^2$, a quadratic term for domestic development in our full model to evaluate whether there are any non-linear trends. The term γ_i represents investor country fixed effects and captures any country-specific differences, including differences in the respective tax regime or the extent to which a country hosts financial shell companies belonging to a foreign group.[8] The term τ_t represents quarterly fixed effects and captures any other time-varying macroeconomic developments that could influence investors' portfolio allocation. Standard errors are clustered at the investor country

[8]The inclusion of country investor fixed effects does, however, not entirely capture bilateral country tax differences in the form of withholding taxes and related bilateral agreements to compensate taxation at source. Given that the taxation of income from securities is not harmonised at the EU level, this can result in situations where investors from some countries may find it less attractive to invest in non-domestic euro area securities. This could be the case, for instance, when they are confronted with double taxation.

level, to account for any possible unobserved heterogeneity across investors in different counties. ϵ_{it} captures the idiosyncratic error term.

We estimate our regression model for both an unweighted and a weighted sample based on a country's share in the aggregate euro area green bond market. We do so to capture the immediate effects of direct green bond market development as well as the gradual effects as domestic green bond markets develop further over time. More specifically, the unweighted regression models include all country-quarter observations, irrespective of whether individual countries had a domestic green bond market. If no domestic green bond market exists in a certain country but the investors of that country invest in foreign green bond markets, home bias will be zero for the specific country-quarter observation. As such, our unweighted regression models predominately capture the impact of initial bond market development – from no market to a market – on home bias. If domestic green bond supply constraints were to play a role, one would expect a positive relation between domestic green bond development and green bond home bias. Given that, by construction, the unweighted models place an emphasis on the initial 'jump' effect, a statistically significant positive coefficient would imply that investors turn to their domestic green bond market as soon as this option becomes available. The weighted models, by definition, only capture country-quarter observations for countries that already have a domestic green bond market in a certain quarter and give greater prominence to countries with a larger green bond market. The weighted specifications therefore capture home bias dynamics as the countries' domestic green bond market grows in size over time. A statistically significant positive relation between domestic development and home bias would imply that investors increasingly overweigh their holdings of domestic green bonds as their domestic green bond market develops further.

2.4.2 Results

Table 2.6 shows the results of our regression analysis for all euro area investors in Panel I and all euro area banking sectors in Panel II. For both groups of investors, Columns (1)-(2) and (5)-(6) show the results for our unweighted model specifications, which predominately capture the impact of initial green bond market development on green bond home bias. Columns (3)-(4) and (7)-(8) show the results for our weighted model specifications, which highlight home bias dynamics as countries' domestic green bond markets grow.

The regression results in Panel I of Table 2.6 reveal that investors in countries entirely invested in foreign green bond markets due to lack of domestic supply turn to their home market as soon as green bonds become available domestically. This is indicated by the positive relation between domestic green bond market development and home bias in Columns 2 and

6, which is statistically significant at the 1% and 5% level, respectively. However, results indicate that a more complex relation emerges once a domestic green bond market has been established. Initially, investors' green bond home bias seems to decline as their domestic green bond market develops further, as indicated by the negative and statistically significant direct relation at the 10% level between domestic green bond development and home bias in Columns 4 and 8. However, the positive and significant squared term indicates that this effect diminishes and home bias further increases once the size of the domestic green bond market reaches around 6% of a country's conventional bond market (based on the model represented in Column 8), albeit to a lesser extent than the initial jump effect. Given these dynamics, it is expected that average green bond home bias in the euro area will equal investors' home bias in conventional bonds once their domestic green bond markets reach an average size of 6% of their respective conventional bond markets.

Panel II of Table 2.6 zooms in on the relation between domestic green bond market development and green bond home bias by the euro area banking sectors. Similar to our findings for all investors in Panel I, euro area banking sectors turn to their domestic green bond markets once these become available in their jurisdiction (Columns 2 and 6). However, after this initial jump effect, the further development of the domestic green bond market does not seem to affect the euro area banking sectors' bias towards domestic green bonds (Columns 4 and 8).

Table 2.6: Green bond home bias and supply constraints – evidence for euro area investors

This table provides results for regression eq. 2.2, which indicates the relation between investors' domestic green bond market development and their green bond portfolio home bias. Columns (1)-(2) and (5)-(6) provide the results for our unweighted sample, which includes all investor country-quarter observations irrespective of whether individual countries had a domestic green bond market. If no domestic green bond market exists in a certain country but the investors of that country invest in foreign green bond markets, home bias will be zero for the specific country-quarter observation. As such, our unweighted regression models predominately capture the impact of initial bond market development – from no market to a market – on home bias. Columns (3)-(4) and (7)-(8) provide the results for our weighted sample. They only capture investor country-quarter observations for countries that already have a domestic green bond market in a certain quarter and they give greater prominence to countries with a larger green bond market. The weighted specifications therefore capture home bias dynamics as the countries' domestic green bond market grows in size over time. Panel I shows the results for all investors across euro area countries. The number of clusters represents the number of euro area countries (all investors) included in our panel. Our time series ranges from Q4 2013 to Q3 2021 (32 quarters). Please note that for 32 country-quarters in our panel data we observe no domestic green market nor foreign investment in green bonds. Panel II shows the results of the euro area banking sectors. The number of clusters represents the number of euro area countries (banking sectors) included in our panel. Our time series ranges from Q4 2013 to Q3 2021 (32 quarters). Please note that for 100 country-quarters in our panel data we observe no domestic green market nor foreign investment in green bonds. Standard errors, shown in parentheses, are clustered at the investor country level. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively.

Green bond home bias and supply constraints								
I. All euro area investors								
	All countries		Countries with GB market		All countries		Countries with GB market	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Development	0.0660***	0.0646***	-0.0322	-0.0646*	0.0784**	0.0779**	-0.1480	-0.1868*
	(0.0202)	(0.0220)	(0.0225)	(0.0345)	(0.0357)	(0.0363)	(0.0955)	(0.0932)
Development^2					-0.0026	-0.0025	0.0249	0.0183*
					(0.0061)	(0.0058)	(0.0163)	(0.0091)
Constant	0.0944***	0.1177*	0.3773***	0.7030***	0.0909***	0.1188*	0.4400***	0.7027***
	(0.0180)	(0.0581)	(0.0308)	(0.0361)	(0.0205)	(0.0581)	(0.0686)	(0.0296)
Observations	576	576	346	346	576	576	346	346
Time FE	No	Yes	No	Yes	No	Yes	No	Yes
Investor Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Weighted	No	No	Yes	Yes	No	No	Yes	Yes
Adj. R-squared	0.692	0.678	0.684	0.882	0.692	0.678	0.731	0.890

Continued on next page

Table 2.6: Green bond home bias and supply constraints – evidence for euro area investors (continued)

Green bond home bias and supply constraints								
I. All euro area investors								
	All countries		Countries with GB market		All countries		Countries with GB market	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
No. clusters	19	19	17	17	19	19	17	17
II. Banking sectors								
	All countries		Countries with GB market		All countries		Countries with GB market	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Development	0.0953***	0.0841***	0.0019	-0.0535	0.1722***	0.1699***	-0.0588	-0.1345
	(0.0207)	(0.0213)	(0.0179)	(0.0379)	(0.0537)	(0.0569)	(0.1124)	(0.1648)
Development^2					-0.0163	-0.0161	0.0131	0.0122
					(0.0097)	(0.0098)	(0.0206)	(0.0205)
Constant	0.1292***	0.2831*	0.3332***	0.7059***	0.1031***	0.2987*	0.3661***	0.7057***
	(0.0215)	(0.1597)	(0.0246)	(0.0079)	(0.0300)	(0.1630)	(0.0750)	(0.0106)
Observations	494	494	346	346	494	494	346	346
Time FE	No	Yes	No	Yes	No	Yes	No	Yes
Investor Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Weighted	No	No	Yes	Yes	No	No	Yes	Yes
Adj. R-squared	0.692	0.678	0.684	0.882	0.692	0.678	0.731	0.890
No. clusters	19	19	17	17	19	19	17	17
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

2.5 Green bond home bias and banks' sustainability ambition

In this section, we investigate whether, as well as domestic green bond supply, investors' sustainability ambition may be a driver behind the lower home bias levels observed in green bond markets compared to conventional bond markets. More specifically, we assess whether banks that are a TCFD supporter, committing themselves to disclose climate risks and opportunities, are more inclined to invest in green bond markets abroad and hence whether their green bond portfolios exhibit lower levels of home bias compared to banks that are not TCFD supporters.

2.5.1 Methodology

Exploiting bond holdings data at the banking group level in combination with information on the banks' FSB TCFD supporter status and using a fixed effects panel data model, we assess whether portfolio home bias is smaller for banks with this status compared to banks without this status. We estimate the following model, which we run across different euro area country subsamples for the period Q3 2018 to Q3 2021:

$$\begin{aligned} HB_{it} = \beta_0 + \beta_1 ClimateDisclosure_{it} + \beta_2 DomesticDevelopment_{it} + \\ \beta_3 ClimateDisclosure_{it} \cdot DomesticDevelopment_{it} + \beta_4 CET1_{it} + \\ \beta_5 ROAE_{it} + \gamma_i + \tau_t + \epsilon_{it} \end{aligned} \tag{2.3}$$

The dependent variable HB_{it} represents a banking group i's green bond home bias in quarter t. Our main explanatory variable, $ClimateDisclosure_{it}$, is a dummy indicator that equals one if a bank is a TCFD supporter in quarter t and zero otherwise. As discussed, we use a bank's climate disclosure status as a proxy for its sustainability ambition.[9] We control for the impact of banks' domestic green bond market development, $DomesticDevelopment_{it}$, expressed by the outstanding amount of green bonds issued by the respective country the bank is located in relative to the outstanding amount of all bonds issued by that country. By including $ClimateDisclosure_{it} \cdot DomesticDevelopment_{it}$, we also capture possible interaction between the depth of the domestic market and banks' sustainability ambition. Our full model includes two key bank control variables that are common in the banking literature

[9] Note that TCFD supporter banks amount to 16 in the third quarter of 2018 (compared to 87 banks that do not carry the TCFD supporter status). This number increases to 35 in the third quarter of 2021 (compared to 71 non-supporters).

to capture the risk-return strategy of the respective bank that could impact home bias through specific investment decisions. In particular, we add banks' CET1 ratio, a bank resilience indicator calculated as common equity over risk-weighted assets as well as the return on average equity (ROAE), a performance measure calculated as net income as a percent of average total equity, where average total equity excludes hybrid capital. We also include banking group fixed effects represented by γ_i to capture any possible unobserved heterogeneity across banks such as differences in business models. We also include time-fixed effects τ_t to filter out any other time-varying macroeconomic developments that could influence banks' green bond portfolio allocation. Standard errors are clustered at the banking group level. ϵ_{it} represents the idiosyncratic error term.

We estimate our model for various data subsamples to uncover heterogeneity between banks in countries with various levels of domestic green bond market development. First, we run our model only for banking groups in countries that already have a domestic green bond market. In this estimation, bank-quarter observations are treated as missing when the bank's country of domicile has no green bond market. As such, this estimation filters out any 'jump' effects on green bond home bias that are observed when a country transitions from not having to having a domestic green bond market. More specifically, we estimate our model separately for banking groups in all euro area countries with a domestic green bond market, and for the sample excluding banking groups from Germany and France, as these countries have the largest green bond markets. Second, we use a sample in which we include bank-quarter observations of banks whose country of domicile does not have a green bond market, thus including observations where we could observe 'jump' effects for countries that go from not having to having a domestic green bond market. We estimate our model in three different ways. We estimate the model first for banking groups in all euro area countries, then for the banks in the five euro area countries with the largest domestic green bond market development, and finally for banks in the two frontrunner countries Germany and France.

2.5.2 Results

Table 2.7 provides our baseline regression results for the various country samples. Our results do not provide general support for the view that banks' elevated sustainability ambition drives cross-border green bond investments and lower levels of home bias. Effects are only significant for banks in countries with a relatively well-developed domestic green bond market. Moreover, the beneficial impact of banks' sustainability ambition on green bond home bias dissipates quickly as banks rebalance their portfolio towards domestic green bonds as their domestic market grows further.

We do not find any statistically significant relation between banks' sustainability ambition and green bond home bias when looking at all countries in our sample, regardless of whether we consider all countries with a domestic green bond market (Columns (1) and (2)) or all countries regardless of whether they already have a domestic green bond market (Columns (3) and (4)). We do observe a negative and statistically significant relation between banks' sustainability ambition and green bond home bias when zooming in on the five countries with the most developed domestic green bond market (Column (7)). For banks that are TCFD supporters and hence more ambitious in terms of sustainability, on average green bond home bias is 14 percentage points smaller (from 0.44 to 0.3 (-0.14)). We find similar results when only considering banks in Germany and France (Columns (9) and (10)), the frontrunners in terms of green bond market development. For banks in these countries, we observe a decline in average home bias from 0.23 to 0.06 (-0.17) when banks increase their sustainability ambition. Moreover, we observe additional dynamics (Column (10)): as well as observing a negative and statistically significant relation between banks' sustainability ambition and green bond home bias, we observe a positive and significant interaction effect between banks' sustainability ambition and domestic green bond market development. This result suggests that while an elevated sustainability ambition initially seems to motivate banks to invest in green bonds cross-border, this effect is negated by their preference for domestic assets. In addition, we assess whether the TCFD supporter status is more relevant if linked with banks' share of green bonds irrespective of the place of issuance, estimated relative to total banks' balance sheets. Unreported results reveal no statistically significant effect across all specifications.

Table 2.7: Green home bias, supply constraints and sustainability preferences

This table provides results for regression eq. 2.3, which indicates the relation between banks' sustainability ambition (as measured by their *ClimateDisclosure* status) and their green bond portfolio home bias. Results are provided for various data samples to show heterogeneity between banks in countries with various levels of domestic green bond market development. The number of clusters indicates the number of banking groups included in the regression. The number of observations indicates the number of banking group-quarter observations in our sample. Columns (1) and (2) do not account for observations where a country has no green bond market as these are treated as missing values. In Columns (3) and (4), we replace these missing values with zero and include observations when a country does not have a domestic green bond market. Columns (5) and (6) are a replication of (3) and (4) but excluding DE and FR. Columns (7) and (8) are a replication of (3) and (4) but only include DE, ES, FR, IT and NL, the largest green bond issuers. Columns (9) and (10) only account for DE and FR. Standard errors, shown in parentheses, are clustered at the banking group level. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively.

Banking Groups	All countries with GB market		All countries		All countries with GB market (no DE/FR)		Largest EA countries		Germany and France	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ClimateDisclosure	-0.0586	-0.0935	-0.0407	-0.0729	0.0209	0.0990	-0.1447***	-0.1835**	-0.1657**	-0.4022***
	(0.0722)	(0.0906)	(0.0690)	(0.0899)	(0.0880)	(0.1187)	(0.0494)	(0.0811)	(0.0809)	(0.0732)
Development	0.0192	0.0075	0.0259	0.0154	0.0132	0.0379	-0.0114	-0.0323	0.0918	-0.0033
	(0.0260)	(0.0224)	(0.0243)	(0.0216)	(0.0274)	(0.0258)	(0.0549)	(0.0378)	(0.0870)	(0.0668)
ClimateDisclosure		0.0235		0.0217		-0.0536		0.0316		0.1411***
xDevelopment		(0.0425)		(0.0425)		(0.0535)		(0.0526)		(0.0355)
Constant	0.3647***	0.3753***	0.3196***	0.3283***	0.3486***	0.3316***	0.4439***	0.4626***	0.2264**	0.3332***
	(0.0428)	(0.0361)	(0.0405)	(0.0358)	(0.0477)	(0.0431)	(0.0643)	(0.0482)	(0.1002)	(0.0808)
Observations	992	992	1,040	1,040	732	732	633	633	308	308
No. clusters	95	95	101	101	70	70	61	61	31	31
Quarterly FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.0157	0.0165	0.0171	0.0177	0.0157	0.0231	0.0164	0.0179	0.0227	0.0901
Robust standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

Table 2.8: Green home bias, supply constraints and sustainability preferences – Banking groups (robustness)

This table zooms in on the relation between banks' sustainability ambition (as measured by their *ClimateDisclosure* status) and their green bond portfolio home bias for two sets of investors: the banking groups of the largest EA countries in terms of green bond issuance (Columns (1) to (3)) and the banking groups of Germany and France (Columns (4) to (6)). As a robustness check, we include the banking groups' core equity tier 1 (CET1) ratio and return on average equity (ROAE) as controls. The number of observations indicates the number of banking group-quarter observations in our sample. The number of clusters indicates the number of banking groups we observe in our panel data. Our time series ranges from Q3 2018 to Q3 2021 (13 quarters). Standard errors, shown in parentheses, are clustered at the banking group level. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively.

Banking Groups from:	Largest EA countries (1-3)			Germany and France (4-6)		
	(1)	(2)	(3)	(4)	(5)	(6)
ClimateDisclosure	-0.0902	-0.0769	-0.1764*	-0.1899***	-0.1208	-0.3500***
	(0.0545)	(0.0567)	(0.0910)	(0.0655)	(0.0720)	(0.0930)
Development		0.0413	-0.0363		0.1322	-0.0138
		(0.0569)	(0.0525)		(0.0828)	(0.0696)
ClimateDisclosurexDevelopment			0.1148*			0.1759***
			(0.0652)			(0.0583)
CET1 ratio	-0.0138	-0.0145	-0.0092	-0.0325***	-0.0510***	-0.0290**
	(0.0102)	(0.0111)	(0.0093)	(0.0094)	(0.0151)	(0.0137)
ROAE	0.0073**	0.0074**	0.0080***	0.0079***	0.0119***	0.0100***
	(0.0031)	(0.0031)	(0.0030)	(0.0028)	(0.0032)	(0.0027)
Constant	0.6256***	0.5994***	0.5737***	0.7878***	0.9128***	0.7286***
	(0.1547)	(0.1676)	(0.1391)	(0.1422)	(0.1694)	(0.1784)
Observations	403	403	403	199	199	199
No. clusters	50	50	50	26	26	26
Quarterly FE	Yes	Yes	Yes	Yes	Yes	Yes
Banking Group FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.0420	0.0734	0.0585	0.0465	0.0635	0.109

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

2.6 Conclusion

Nascent and slowly developing markets are an ideal set-up to assess how supply of an asset class (that is limited and gradually evolving) affects cross-border investment decisions and ultimately country-level home bias. Using the European green bond market, a market that is only gradually evolving, we explore how home bias develops over time, and more specifically are able to disentangle supply from demand effects. In a first step, we investigate how green bond supply constraints drive investors' green bond home bias in the euro area. To this end, we compare home bias in green bond versus conventional bond markets and assess the relation between euro area green bond supply and euro area green bond portfolio home bias for euro area investors. We conduct our analysis across all euro area investor types, the euro area banking sectors and the largest euro area banking group. Second, zooming in on the largest banking groups, we investigate whether investors' sustainability ambition could in part explain lower levels of green bond home bias.

We document that green bond markets are currently more integrated than conventional bond markets across the euro area, as evidenced by significantly lower levels of investors' home bias in green bond markets. However, green bond markets are generally becoming less integrated over time as domestic green bond markets mature. In the aggregate across all euro area investors, we find that investors who only hold foreign green bonds shift their portfolios towards domestic bonds as soon as green bonds become available in their home country, in the absence of a domestic green bond market. After this initial correction, home bias slowly increases further as the domestic market develops, suggesting that the overall positive integration trend (lower home bias) of green bond markets only gradually diminishes as domestic markets continue to grow. Similar to our findings across all investors, euro area banking sectors turn to their domestic green bond markets once these become available in their jurisdiction. However, after this initial jump effect, the further development of the domestic green bond market does not seem to affect their bias towards domestic green bonds. Finally, our regression analysis shows that an increase in large banks' sustainability ambition can partly explain cross-border green bond investments and lower levels of home bias for banks in countries with a relatively well-developed domestic green bond market. The beneficial impact of banks' sustainability ambition on green bond home bias seems to dissipate quickly, however, as banks rebalance their portfolio towards domestic green bonds as their domestic market grows.

As our findings hint at the presence of barriers to cross-border investments in the euro area,[10] from a policy perspective it may be important for EU policymakers and regulators to

[10]Barriers could include information asymmetries and lack of transparency, or lack of harmonisation in rules

identify and address these barriers in order to mobilise sufficient funds to finance the transition to a sustainable economy, as economies with suboptimal levels of capital market integration and risk-sharing are less able to finance large innovations. The European Commission has put forward various initiatives to foster green capital market integration, such as the development of a common classification system for sustainable activities, a sustainability risk disclosure framework for non-financial and financial companies, and investment tools such as sustainability benchmarks, standards and labels (European Commission, 2021b). These initiatives aim to reduce barriers to cross-border investments by improving market transparency and promoting harmonisation. Policymakers and regulators will need to evaluate the effectiveness of these measures to foster green capital market integration and adjust policies where needed.

Future research could contribute to the ongoing discussion on policy development, as well as to existing home bias literature, by studying the effects of transparency and disclosure rules and regulations on home bias in green bond markets. In addition, since green bond markets are still in the early stages of development, it would be relevant to test whether our findings on the relation between green bond supply and green bond home bias hold when the green bond market develops further. Moreover, future research could investigate whether green bond home bias varies between issuer types. For instance, sovereign green bonds may exhibit higher levels of home bias than green bonds issued by other sectors. A potential explanation is that sovereign green bonds benefit from preferential treatment under certain prudential and regulatory frameworks for banks, which may increase incentives for domestic holdings. Furthermore, future research could investigate whether the observed link between green bond home bias and green bond supply is driven by developments in other sustainable finance instruments, such as sustainable loans. As this study captures only one segment of the sustainable finance market, substitution effects may partly explain observed dynamics in green bond holdings. Finally, our analysis of investors' sustainability ambitions as a behavioural driver of home bias could be further improved, for instance by developing better proxies for investors' sustainability ambitions and extending the scope of the analysis to different types of investors.

and regulations, e.g. tax regimes.

Chapter 3

Climate-related financial disclosures and green bond home bias

Abstract This study examines whether voluntary climate-related financial disclosures can help companies attract foreign investors to their green bond issuances, thereby reducing investor home bias. I use the nascent euro area green bond market between 2014 and 2022 and the introduction of a new international climate-related disclosure standard in 2017 as an empirical case study. I observe substantial differences between companies that adopt the disclosure standard and those that do not. Adopters tend to be larger in size and issue larger volumes of bonds, which are also characterised by longer maturities and larger issue sizes. The relation between climate disclosures and green bond home bias seems nuanced and varies depending on the green bond markets' level of development as well as company and bond-level characteristics. Based on a cross-sectional exploration of the data, I observe a negative association between disclosures and home bias for 'low-risk' bonds and a positive association for 'high-risk' bonds. Using two-way fixed effects regression across all bonds, I find only limited evidence of a negative association between climate-related disclosures and green bond home bias. These findings appear to be mainly driven by dynamics in countries with green bond markets in earlier stages of development, where home bias is comparatively high. In addition, through an event study based on a matched sample of companies, I show that the reduction in green bond home bias following the adoption of the climate-related disclosure standard is small and temporary, dissipating within a few quarters after adoption.

3.1 Introduction

A major challenge faced by European policymakers and regulators today is mobilising the private sector to fund the transition to a sustainable economy. In 2019, the European Union (EU) adopted a strategy to make Europe climate neutral by 2050. Making the European economy more sustainable requires substantial investments from both public and private parties.[1] The challenge arises, in part, because investors have a tendency to overinvest in domestic assets. This phenomenon, known as home bias,[2] not only leads to suboptimal results for investors themselves but also hampers efficient capital allocation and risk sharing in the broader market, leaving companies with fewer funding options and higher funding costs (see e.g. Merton (1987)).

Over the past few years, the EU has adopted various pieces of legislation aimed at mandating corporate climate-related disclosures and improving transparency for investors. The goal is to help investors make informed decisions on how to channel their funds across EU countries to facilitate the transition and to more broadly enhance financial integration in the Union. These policies can be viewed through the lens of the well-established home bias literature, which has identified information asymmetries as an important determinant. The premise is that investors have access to better and cheaper information on domestic companies and therefore face comparatively greater uncertainty about foreign companies' performance. This ultimately drives investors to allocate more funds domestically (Merton, 1987; Gehrig, 1993). Some theoretical models show that home bias emerges endogenously as investors specialise in collecting information on domestic companies (Lundtofte, 2009; Van Nieuwerburgh and Veldkamp, 2009). This can be the case even when the initial information asymmetries are small and information about foreign companies can be acquired at low cost (Van Nieuwerburgh and Veldkamp, 2009).

The impact of corporate disclosures on investor home bias is however not yet fully understood. On the one hand, there is a strand of literature showing that corporate disclosures could reduce home bias. To my knowledge, Eichler (2012) is the first to explicitly model corporate disclosures in an information acquisition model. The model shows that jurisdictions with credible corporate disclosures and robust securities laws can attract more foreign investments, and achieve lower home bias, by reducing uncertainty about firms' future returns.

[1] The European Commission has estimated that reaching the 2030 climate and energy targets alone would require EUR 260 billion worth of investments per year until then (European Commission, 2019a; European Commission, 2019b).

[2] According to the seminal international capital asset pricing model (see Sharpe (1964) and Solnik (1974)), rational investors should hold financial assets in proportion to the assets' respective shares in the global market portfolio in frictionless markets with complete information. Any over-weighting of domestic assets would lead to a suboptimal risk-return profile.

Empirical support for the claim that credible disclosure regulations and outside investor protection can help attract foreign investors is provided, for example, by Leuz, Lins and Warnock (2009), Dahlquist et al. (2003), Gelos and Wei (2005) and Aggarwal, Klapper and Wysocki (2005). In addition, several studies, including Bradshaw, Bushee and Miller (2004), Aggarwal, Klapper and Wysocki (2005) and Ahearne, Griever and Warnock (2004), highlight the positive effect of adhering to internationally accepted (US) accounting standards, governance and disclosure rules.

On the other hand, a different strand of home bias literature appears to contrast these findings. The theoretical models by Lundtofte (2009) and Van Nieuwerburgh and Veldkamp (2009) suggest that despite investors' ability to learn about foreign firms at low cost, they decide to specialise in domestic portfolio investments. It is therefore not a priori clear whether improved corporate disclosures would lead to further specialisation or diversification. Empirical support for the specialisation school of thought can be found in, for example, Coval and Moskowitz (1999), who demonstrate that home bias persists even within countries. The authors show that US fund managers exhibit a preference for small and highly leveraged local firms and are able to earn excess returns. Similar evidence is found by Ivkovic and Weisbenner (2005), who find that US retail investors and mutual fund managers have a strong local bias and are able to earn excess returns.

With this study, I aim to shed new light on the relation between corporate disclosure and home bias. Specifically, I use the nascent euro area corporate green bond market between 2014 and 2022 and the introduction of a new international climate-related disclosure standard in 2017 as an empirical case study. In this context, I assess whether and how the voluntary adoption of climate-related financial disclosures by financial and non-financial companies in the euro area affects investor home bias for the green bonds that these companies issue. My data include 859 green bonds issued by 244 euro area companies in 17 euro area countries. By examining the emerging euro area green bond market, I can leverage its largely unregulated nature and the presence of significant information asymmetries (see e.g. European Union (2023) and European Commission (2021a)). In other words, if corporate disclosure affects home bias, it is likely that such a relation would come to the fore in a market with low initial levels of transparency. In addition, I can examine the trends in home bias over time for green bonds issued by companies that adhere to and those that do not adhere to the international climate disclosure standard.

A first exploration of the data and cross-sectional regression analysis suggest that green bond home bias depends on local green bond market development as well as on company- and bond-level characteristics. Notably, the data suggest that the association between disclosures and home bias depends on the riskiness of the bond, revealing a negative relation for 'low-risk'

bonds and a positive relation for 'high-risk' bonds. These dynamics seem primarily driven by local green bond markets in earlier stages of development, where home bias is comparatively high. In a second step, I study the impact of climate-related corporate disclosure on green bond home bias using various panel data regression techniques. Using two-way fixed effects regression, I find only limited evidence of a negative association between climate-related disclosures and green bond home bias. Again, these findings appear to be driven by dynamics in countries with green bond markets in earlier stages of development. Through an event study based on a matched sample of companies, I show that the reduction in green bond home bias following the adoption of climate-related disclosure standards is at best small and temporary, dissipating within a few quarters after adoption. These results should be interpreted with caution given the limitations of my dataset, which include a limited number of green bonds that were issued prior to a company's adoption of the disclosure standard and a concentration of green bond issuances in a few countries that have more advanced green bond markets. My findings suggest that while corporate climate-related disclosures may facilitate cross-border investment, the effect could be limited and context dependent. This is consistent with the mixed evidence reported in the literature on home bias.

This study contributes to the home bias literature in several ways. First, it adds to the body of empirical research that explicitly examines the relationship between corporate disclosure practices and investor home bias (e.g. Leuz, Lins and Warnock (2009), Dahlquist et al. (2003), Gelos and Wei (2005) and Bradshaw, Bushee and Miller (2004)). Moreover, by drawing on insights from the literature on the determinants of voluntary disclosures (see e.g. Ali, Frynas and Mahmood (2017)), this study bridges several closely related fields of research. Second, the majority of empirical home bias studies are written from a US investor perspective and/or focus on equity home bias. This study focuses on the euro area and the bond market, specifically green bond markets. Third, most studies are based on cross-sectional regression estimation techniques (e.g. Aggarwal, Klapper and Wysocki (2005), Chan, Covrig and Ng (2005) and Leuz, Lins and Warnock (2009)) or pooled OLS and random effects in a panel framework (e.g. Eichler (2012)). This study complements cross-sectional analysis with two-way fixed effects regression and an event study based on a matched sample of companies, with a view to better identify the impact of climate-related disclosures on green bond home bias, although results should be interpreted with caution given the nature and limitations of my data. This study furthermore complements the growing literature on cross-border green lending that uses granular loan-level data (e.g. Benincasa (2021) and Capera Romero and Artiga González (2025)) by examining cross-border investment in green bonds, thereby extending the analysis to market-based finance, which represents a substantial source of corporate funding alongside bank lending.

Finally, insights from this case study may be of interest to EU policymakers and regulators. The recent EU legislation aimed at mandating corporate climate-related disclosures is currently being amended with the objective of simplification and burden reduction (see e.g. European Commission (2025d), European Commission (2025b) and Council of the European Union (2025)). For example, a substantial scope reduction for corporate sustainability reporting has been proposed, leaving only the largest corporations in scope. My findings suggest that regulators could consider further tailoring policies by sector and market segment to maximise the impact of disclosures on investor behaviour while maintaining a targeted approach.

The rest of the paper is organised as follows. Section 3.2 describes the data and variables used. Section 3.3 provides an overview of the development of the euro area green bond market. Section 3.4 explores the relation between green bond home bias and climate-related corporate disclosures, including through cross-sectional regression analysis. Section 3.5 investigates whether voluntary climate-related disclosures can help companies attract foreign investors, using panel regression analysis and an event study based on a matched sample of companies. Section 3.6 discusses the results and concludes.

3.2 Data and variables

To study the relation between corporate climate-related disclosures and green bond home bias, I use quarterly panel data covering 17 euro area countries[3] from Q1 2014 to Q1 2022. A comprehensive overview of the variables and data sources used for the analysis in this study is presented in Table 3.1.

3.2.1 Green bond home bias

My main dependent variable of interest is home bias for green bonds that are issued by euro area companies. I derive my measure for green bond home bias from the confidential Securities Holdings Statistics (SHS) collected by the European System of Central Banks (ESCB), in combination with Bloomberg's green bond labels. The SHS database contains detailed information on the holdings of long-term (maturity > 1 year) debt securities by euro area residents on a quarterly basis. Each observation corresponds to an ownership position in a bond, which is identified by the security's International Security Identification Number (ISIN). The granular bond-level holdings are available at the country-sector level of aggregation. This means that for each euro area country, I observe bond holdings of (among others)

[3] For two euro area countries, Cyprus and Malta, I do not observe any green bonds in the data.

banks, pension funds, insurance companies, investment funds, other financial intermediaries, non-financial corporations, governments and households. For the purpose of this analysis, I use quarterly data from Q1 2014 to Q1 2022. To identify green bonds, I complement the SHS dataset with Bloomberg's green bond labels. Bloomberg established a green bond database in 2014 that has coverage dating back to the inception of the global green bond market in 2007. In the database, a bond is labelled a 'green bond' if the issuer self-identifies it as such in the issuance documentation and/or in official public communications, stating that 100% of the proceeds will be allocated to green activities, as defined by the Green Bond Principles established by the International Capital Market Association (International Capital Markets Association, 2022). However, Bloomberg does not require any additional reporting on the management and use of proceeds, nor the assurance of an external provider (GBP SBP Databases and Indices Working Group, 2018).

To arrive at a home bias measure for individual bonds, I deviate slightly from mainstream home bias literature, which usually assesses home bias from the perspective of the investors' entire portfolio. Nevertheless, my home bias measure is in line with existing practice. I base my measure on Cooper, Sercu, Vanpee et al. (2013), who developed a home bias metric that has desirable properties when the observed and/or optimal weight of a financial asset in an investors' portfolio is small. This is the case in my setup, since I evaluate individual bonds rather than portfolios of bonds. The dependent variable is defined as:

$$HB_{it} = \left[\frac{2}{1 + e^{\left(\frac{a_{it} - w_{it}}{\sqrt{w_{it} \cdot (1 - w_{it})}} \right)}} - 1 \right] \times 100 \tag{3.1}$$

In Eq. 3.1, HB_{it} represents the level of home bias for bond i in quarter t. Home bias is computed as the difference between the actual weight of green bond i in domestic investors' (collective) green bond portfolio at time t, a_{it} and the optimal portfolio weight according to the international capital asset pricing model, w_{it}. Since the analysis focuses on the euro area green bond market, both the optimal and actual portfolio weights are calculated based on the outstanding amount of green bonds issued by euro area entities and denominated in euros.[4] In other words, conventional bonds issued by these green bond issuing companies,

[4]Please note that my measure of home bias is upwardly biased, as it is based on the universe of bonds issued *and* held by euro area investors in a given quarter. However, bonds issued by euro area companies are not necessarily held by euro area investors in all periods. Since full ownership outside the euro area would, by definition, imply a negative home bias, my measure is biased upwards because such observations are not captured in the data. Although it would be possible to correct for this bias by imputing the missing observations with negative home bias, the dataset would still contain gaps in important covariates, such as amount outstanding and yield to maturity, which would be difficult to extrapolate without making strong assumptions.

as well as conventional bonds issued by other euro area companies and bonds denominated in another currency than euros, are excluded from the analysis. Following Cooper, Sercu, Vanpee et al. (2013), I scale the difference between the actual and optimal portfolio weights by $\sqrt{w_{it} \cdot (1 - w_{it})}$, which represents the standard deviation of a single portfolio weight allocation choice by an investor, assuming that investors randomly allocate portfolio weights whereby $a_{it} - w_{it}$ follows a binomial distribution. To avoid HB_{it} approaching minus infinity when w_{it} approaches zero, the standardised home bias measure is subjected to a logistic transformation. A linear transformation is applied so that HB_{it} ranges from -1 to 1 and has a value of 0 when $a_{it} = w_{it}$. For the purpose of this analysis, I multiply the home bias measure by a factor of 100 to improve readability. Finally, it should be noted that while the home bias measure is computed on the basis of the entire euro area market of green bonds that are denominated in euros (including green government bonds), the analysis is limited to an assessment of the relation between climate-related disclosure and home bias for financial and non-financial companies (excluding green government bonds). This is because the focus of my research is on private companies and the effect of corporate disclosure. The dynamics for government bonds are likely to be very different, given that they have different risk characteristics and frequently receive special regulatory treatment that can influence the holdership of these bonds.

3.2.2 International climate-related disclosure standard

In 2017, the Financial Stability Board's (FSB) industry-led Task Force on Climate-related Financial Disclosures (TCFD) published the first global international standard on climate-related financial disclosures. The standard was introduced to promote more informed investment decisions and to enable market participants to better understand and assess climate-related risks and opportunities. Although the practice of environmental, social and governance (ESG) reporting has been around for a while, the TCFD standard is specifically geared towards climate-related financial disclosures. Not surprisingly, these recommendations were published when demand for corporate sustainability information skyrocketed, fuelled by investors' increased awareness of the possible financial implications of climate risks. This, in combination with the absence of a harmonised EU framework for corporate sustainability reporting during the study period, offers a unique opportunity to examine how reduced information costs and asymmetries, through corporate disclosure, affect home bias.[5]

[5]While no harmonised EU regulatory framework for corporate sustainability reporting was in place during the observation period, it was well underway. In the context of the EU's Green Deal reforms, the EU developed a directive on corporate sustainability reporting ((EU) 2022/2464). This directive among other things amended existing non-financial (read ESG) disclosure obligations by requiring more detailed and

Between 2017 and 2023, the TCFD monitored and made public which companies became a supporter of the TCFD standard and in doing so committed themselves to providing disclosures in line with the TCFD's recommendations.[6] I use the TCFD supporter status of a green bond issuing company as an indicator for climate-related corporate disclosures. Specifically, my main independent variable of interest, $ClimateDisclosure$, constitutes a variable that equals zero if the company does not become a TCFD supporter during the observation period. The dummy switches from zero to one if the company that issued the green bond becomes a TCFD supporter during the observation period and in doing so commits itself to providing corporate climate-related disclosures in line with the international standard. I assume that once a company commits itself to providing corporate disclosures in line with the standard, it continues to do so during the remainder of the observation window. In other words, once the $ClimateDisclosure$ dummy switches to one, it does not switch back to zero. It should be noted that since the adoption of the international standard is voluntary, the adoption period can differ across companies.

3.2.3 Control variables

Finally, I augment the data with key bond, issuer company and issuer country characteristics. I source the relevant bond characteristics from the SHS database and Bloomberg, and use Bureau van Dijk's ORBIS database for information on the issuer companies. Regarding issuer country characteristics, I use the World Bank's 'resolving insolvency' scores.

I include several green bond issuer company and issuer country characteristics in my dataset that could influence both the company's propensity to provide climate-related disclosures and investor home bias. Regarding company characteristics, I add variables such as company sector, total assets, leverage and return on assets (ROA). The data for these variables are retrieved from Bureau van Dijk's ORBIS database. I also include the total amount of company bonds outstanding and the share of those bonds that are green bonds (also in terms of amount outstanding). These measures are derived from the SHS data. Finally, I create a dummy variable *Climate Change Contributor*, which equals one if the company belongs to a sector that has been identified by the European Banking Authority (EBA) as highly contributing to climate change (see European Banking Authority (2022)).[7] The indicator is based on the

harmonised climate-related disclosures and extending the scope of application to include a broader range of companies. The directive was published in December 2022.

[6] The list of TCFD supporters was retrieved on 26 February 2022. As of November 2023, the FSB no longer monitors and reports on adoption of the standard. The monitoring task has been taken over by the IFRS International Sustainability Standards Board.

[7] The EBA developed this indicator in the context of ESG disclosure requirements for banks under the EU Capital Requirements Regulation. The EBA uses the EU Taxonomy framework (Regulation (EU) 2020/852)

two-digit NACE sector classification level.[8]

These company-level indicators can be thought of as representing the size and risk of the firm. Larger companies, whether in terms of assets or bond market presence, are likely to be better known by foreign investors,[9] which could lead to lower levels of home bias associated with the bonds of these companies. At the same time, larger companies will probably benefit more from disclosures because they are generally more active in capital markets. By analogy, companies that are more active in green bond markets may be more inclined to provide climate-related disclosures. Also, it seems reasonable to assume that investors are less inclined to hold bonds of high-risk foreign firms compared to low-risk foreign firms in the presence of information asymmetries and costs. Therefore, factors such as a company's sector, company leverage and return may all influence the home bias associated with the company's bond. At the same time, a company's risk level may affect its propensity to disclose. Whether high-risk companies are more or less inclined to disclose than low-risk ones is a priori unclear. They may have more to gain or to lose in terms of funding costs, depending on their fundamentals.

Regarding potentially relevant issuer country characteristics, the dataset includes the World Bank's country resolving insolvency scores, the total outstanding amount of bonds issued by residents of the country, and the share of those bonds that are green bonds (also in terms of amount outstanding). The World Bank's resolving insolvency score represents a composite indicator that scores jurisdictions based on several dimensions that measure the time, costs and outcome of insolvency proceedings. A higher score indicates a better performance in a jurisdiction's ability to resolve an insolvency case. The score can take values from 0 to 100. The resolving insolvency score can be seen as a proxy for institutional quality that is especially relevant to bond investors. Since investors are likely to have a relative preference for investing in jurisdictions where they are better protected, this could influence home bias. Moreover, the level of institutional quality and investor protection may also affect the effectiveness of company disclosures and may therefore also influence company's disclosure decisions. I expect a company's propensity to provide corporate disclosures to be higher if it

to classify sectors that are most highly associated with climate risk. These sectors are identified due to their significant greenhouse gas (GHG) emissions or their role in the transition to a low-carbon economy.

[8] Sectors that are included are: agriculture, forestry and fishing; mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply; water supply, sewerage and waste management; construction; wholesale and retail trade; transportation and storage; and real estate activities. Examples of sectors that are excluded under the Taxonomy based on low emissions or limited impact on the transition to a low-carbon economy include: information and communication; financial and insurance activities; professional, scientific and technical activities; education; and arts, entertainment and recreation.

[9] E.g. because they operate internationally or because they publish more financial or management reports relevant to investors.

is incorporated in a jurisdiction that scores higher on institutional quality.[10] Also, I expect that investors are more familiar with larger bond markets (in terms of outstanding amounts) and hence show less home bias towards bonds issued in countries with larger bond markets.

Finally, the dataset contains bond-level information such as amount outstanding, yield to maturity and maturity. Although not a perfect measure, a bond's outstanding amount can give an indication of the issuance size and the company's presence in bond markets. I expect that companies with more sizeable amounts of outstanding bonds are better known to foreign investors and hence may observe lower levels of home bias for their bonds. The yield to maturity can be considered indicative of the bond's risk. Unfortunately, I do not have credit rating information for most green bonds in my data sample. However, for the subset of bonds for which I do, I observe a negative correlation between the bonds' rating and yield to maturity. That is, bonds with higher credit ratings tend to have a lower yield to maturity. Therefore, I use bonds' yield to maturity as an indicator for risk. I expect that higher levels of home bias are observed for riskier bonds, as domestic investors may have an advantage over foreign investors in terms of assessing the payoff of such investments in the face of information asymmetries and costs. Finally, I include the remaining maturity of bonds as a variable. The longer the remaining maturity of a bond, the higher the credit and market risk to investors.

[10] It should be noted that the resolving insolvency score is very stable over time for the countries in my sample. Therefore, this variable will be more relevant in explaining variation across countries than within countries over time.

Table 3.1: Variable description

Variable name	Data source	Frequency	Description
Dependent variable			
Home bias	SHS, Bloomberg	Quarterly	**Home bias** at the bond level as defined in Eq. 3.1.
Main explanatory variable			
Climate disclosure	Financial Stability Board	Quarterly	**FSB TCFD Supporter status, or Climate Disclosure**, is a dummy indicator signalling whether a financial or non-financial corporation was a supporter of the Financial Stability Board's Task Force of Climate-related Financial Disclosures (TCFD) in quarter *t*.
Bond-level characteristics			
Amount outstanding	SHS	Quarterly	**Amount outstanding** represents the monetary amount of the green bond outstanding at a certain reporting date, measured in EUR bn.
Yield to maturity	SHS	Quarterly	**Yield to maturity** in percent.
Original maturity	SHS	Quarterly	**Original maturity** represents the maturity of a certain bond at issuance, measured in days.
Residual maturity	SHS	Quarterly	**Residual maturity** represents the remaining maturity of a certain bond at a particular reporting date, measured in days.
Company (bond issuer) level characteristics			
Total assets	BvD Orbis	Annually	**Total assets** is a variable representing the green bond issuing company's total assets in EUR bn.
Leverage	BvD Orbis	Annually	**Leverage** represents the ratio between the company's equity and total assets, in percent.
ROA	BvD Orbis	Annually	**ROA**, or return on assets, as computed by the ratio of net income to total assets, in percent.
Total amount outstanding issuer	SHS	Quarterly	**Total amount outstanding issuer** represents the monetary amount of all bonds that a green bond issuing company has outstanding at a certain reporting date, measured in EUR bn. This includes both green and conventional bonds.
Green bond share by issuer	SHS, Bloomberg	Quarterly	**Green bond share by issuer** is defined as the share of green bonds outstanding relative to the total amount of bonds outstanding of a euro area green bond issuer, expressed as a percentage.
Country (of the bond issuer) level characteristics			

continued on next page

Table3.1 – continued from previous page

Variable name	Data source	Frequency	Description
Resolving insolvency score	World Bank	Annually	**Resolving insolvency score**: The World Bank studies the time, cost and outcome of insolvency proceedings involving domestic entities as well as the strength of the legal framework applicable to judicial liquidation and reorganisation proceedings. The data for the resolving insolvency indicators are derived from questionnaire responses by local insolvency practitioners and verified through a study of laws and regulations as well as public information on insolvency systems. The ranking of economies on the ease of resolving insolvency is determined by sorting their scores for resolving insolvency. These scores are the simple average of the scores for the recovery rate and the strength of insolvency framework index. A higher score indicates a better performance in a jurisdiction's ability to resolve insolvency cases.
Total amount outstanding issuer country	SHS	Quarterly	**Total amount outstanding issuer country** represents the monetary amount of all the bonds outstanding in the home country of the green bond issuing company at a certain reporting date, measured in EUR bn. This includes both green and conventional bonds.
Green bond share by issuer country	SHS, Bloomberg	Quarterly	**Green bond share by issuer country** is defined as the total amount outstanding of green bonds relative to the total amount outstanding of all bonds issued by residents in a certain euro area country, expressed as a percentage.

3.3 Euro area green bond market development

The euro area green bond market is nascent but fast growing. The SHS data show an increase in the outstanding amount of green bonds issued in the euro area from EUR 2.78 billion in Q1 2014 to EUR 452.64 billion in Q1 2022.[11,12] In Q1 2014, EUR 2.70 billion of the outstanding amount of green bonds pertained to corporate bonds. This increased to EUR 268.43 billion in Q1 2022. The development of the corporate green bond market varies markedly across euro area countries. I observe that France, Germany, Italy and the Netherlands had developed a corporate green bond market by mid-2014. At the end of 2016, companies from nine euro area countries had issued corporate green bonds. By the end of 2017, this number had increased to 11, and to 17 by mid-2021.[13] Germany, the Netherlands and France have the largest markets based on my dataset, with outstanding amounts of EUR 69.90, 57.82 and 54.88 billion respectively in Q1 2022. Together, these countries represented 68.02% of the euro area corporate green bond market. Banks accounted for 43.35% of the outstanding amount in the euro area corporate green bond market in Q1 2022. Non-financial corporations accounted for 39.39% and other financial institutions for 11.6%. Of the non-financial corporations, the 'electricity, gas and steam and air conditioning' sector was the largest, followed at a distance by 'real estate', 'professional, scientific and technical activities', 'construction' and 'transportation'.

I observe 244 green bond issuing companies that collectively issued 859 green bonds. Of these companies, 58 – who issued 222 green bonds – adopted the international climate-related disclosure standard during the observation window. Only 46 green bonds were issued before the issuing company adopted the international disclosure standard; 176 bonds were issued after the company adopted the standard (see Table 3.2). The characteristics of the green bonds and the green bond issuing companies used in this study are summarised in Tables 3.3 and 3.4. Table 3.5 provides summary statistics of the green bond issuers' country characteristics.

[11] While the euro area green bond market has grown substantially since its inception, it remains small compared to the overall euro area bond market. The outstanding amount of green bonds was 0.1% of the overall bond market in Q1 2014 and 3.0% in Q1 2022.

[12] Please note that the actual size of the euro area green bond market can differ, since the SHS data only contain bonds that are held by euro area investors. Moreover, some bonds were dropped during data cleaning procedures, e.g. bonds with negative remaining maturity, bonds with outstanding amounts smaller than EUR 1,000, bonds issued by an entity of which the LEI was not identifiable, and bonds with extreme yield to maturity (>75).

[13] For two euro area countries, Cyprus and Malta, I do not observe any corporate green bonds in my dataset.

Table 3.2: Summary statistics for green bond home bias by disclosure adoption status and country group

	No. companies	No. bonds	Green bond home bias (bond level) mean	median	sd	min	max	Observations mean	median	sd	min	max
			All issuer countries									
A. Green bond issued prior to climate disclosure												
Obs Pre	26	45	9.78	2.80	21.89	-6.47	99.64	7.89	6	7.19	1	29
Obs Post	26	42	8.10	2.03	21.45	-2.55	99.60	9.33	8	6.48	1	20
All Obs	27	46	8.64	1.68	21.26	-6.47	99.44					
B. Green bond issued after climate disclosure												
Obs Post (all obs)	47	176	4.51	1.24	10.26	-2.60	99.33	6.45	6	4.23	1	19
C. Green bond issued without climate disclosure												
All Obs	186	637	5.36	0.90	15.74	-6.42	100.00	7.20	6	5.88	1	32
			Top 3 issuer countries									
A. Green bond issued prior to climate disclosure												
Obs Pre	16	29	2.20	1.21	3.60	-3.77	9.88	8.24	6	7.40	1	29
Obs Post	16	28	0.75	062	1.89	-2.55	5.35	10.21	10.5	7.28	1	20
All Obs	16	29	1.32	0.93	2.65	-2.61	8.81					
B. Green bond issued after climate disclosure												
All Obs	23	116	0.73	0.71	1.38	-2.60	6.37	6.77	6	4.36	1	19
C. Green bond issued without climate disclosure												
All Obs	97	489	0.98	0.65	2.30	-6.42	12.89	7.28	6	6.06	1	32
			Other issuer countries									
A. Green bond issued prior to climate disclosure												
Obs Pre	10	16	23.52	11.91	32.70	-6.47	99.64	7.25	5.5	6.97	1	23
Obs Post	10	14	22.81	8.73	33.08	0.627	99.60	7.57	6	4.15	2	16
All Obs	11	17	21.12	8.09	31.57	-6.47	99.44					
B. Green bond issued after climate disclosure												
All Obs	24	60	11.82	8.15	15.03	-0.65	99.33	5.85	5	3.92	1	16
C. Green bond issued without climate disclosure												
All Obs	89	148	19.83	8.04	27.93	-3.56	100.00	6.93	5	5.22	1	28

Notes: Continued on the next page.

Notes: This table shows summary statistics related to the level of home bias and the number of observations for the green bonds in my data sample, which covers 859 green bonds issued by 244 companies during the observation window (Q1 2014 to Q1 2022). The statistics are shown for various subsets of the data. First, the statistics are shown for the subset of green bonds that were issued before the issuing company adopted the international climate-related disclosure standard. Second, for the subset of green bonds that were issued after the issuing company adopted the standards. Third, for the green bonds that were issued by companies that did not adopt the standards during my observation window. The statistics are furthermore shown for green bonds issued in all euro area countries in my sample, in the top three green bond issuing countries, and in the other countries. Please note that, because companies may have issued green bonds before and after providing climate-related disclosures, the companies in subsets A and B are not mutually exclusive (and therefore the sum of companies in A, B and C does not equal 244). In addition, please note that I only observe a bond in a given quarter if it is held by at least one euro area holder. As a result, bonds can drop in or out of the sample. Note, for example, that the data include one bond that was issued before the issuing company adopted climate disclosure standards, but that I only observed the bond after the company started disclosing information. For four bonds that were issued before the company adopted climate disclosure standards, I did not observe them after the adoption of disclosure standards.

Table 3.3: Green bond characteristics

This table shows summary statistics related to the characteristics of the green bonds in my data sample, which covers 859 green bonds issued by 244 companies during the observation window (Q1 2014 to Q1 2022). The summary statistics are shown for the entire sample of bonds, as well as for the subset of bonds that were issued by companies that at some point during my observation window adopted the international disclosure standard and the subset of green bonds issued by companies that did not adopt the international disclosure standard during my observation window.

	Mean	Median	StdDev	Min	Max	Obs	nrBonds	nrQuarters
Green bonds issued by companies that adopt international disclosure standards								
Home Bias (bond level, average)	6.61	1.63	16.01	-9.19	99.98	1883	222	33
Original Maturity (days)	4030.46	2922	4537.11	644	29934	1883	222	33
Residual Maturity (days)	3394.93	2370	4605.88	4	29860	1883	222	33
Yield to maturity	0.84	0.55	1.52	-1.24	38	1883	222	33
Amount Outstanding (EUR bn.)	0.57	0.50	0.40	0	1.85	1883	222	33
Amount Issued (EUR bn.)	0.70	0.62	0.47	0	2.08	1832	205	33
Rating At Issuance	7.03	7	2.26	1	15	1441	141	33
Green bonds issued by companies that do not adopt international disclosure standards								
Home Bias (bond level, average)	6.03	1.05	16.64	-11.85	100	4584	637	33
Original Maturity (days)	3011.81	2896	1440.33	547	28764	4584	637	33
Residual Maturity (days)	2443.03	2261	1520.74	12	28489	4584	637	33
Yield to maturity	1.24	0.66	2.13	-1.41	48.13	4584	637	33
Amount Outstanding (EUR bn.)	0.37	0.35	0.46	0	6	4584	637	33
Amount Issued (EUR bn.)	0.44	0.45	0.54	0	7.04	4578	636	33
Rating At Issuance	6.48	7	3.55	1	16	2821	312	33
All green bonds								
Home Bias (bond level, average)	6.2	1.12	16.46	-11.85	100	6467	859	33
Original Maturity (days)	3308.41	2920	2770.6	547	29934	6467	859	33
Residual Maturity (days)	2720.19	2290	2828.57	4	29860	6467	859	33
Yield to maturity	1.12	.63	1.98	-1.41	48.13	6467	859	33
Amount Outstanding (EUR bn.)	0.43	0.50	0.45	0	6	6467	859	33
Amount Issued (EUR bn.)	0.52	0.56	0.53	0	7.04	6411	842	33
Rating At Issuance	6.66	7	3.18	1	16	4262	453	33

Table 3.4: Green bond issuer characteristics

The table shows summary statistics pertaining to the characteristics of the green bond issuing companies in my dataset. The statistics are based on the entire observation period, which covers 33 quarters between Q1 2014 and Q1 2022. The left-hand panel shows unweighted summary statistics at the company level. The right-hand panel shows weighted (bond × quarter observation) summary statistics.

	Mean	Median	StdDev	Min	Max	Nr.Companies	Mean	Median	StdDev	Min	Max	Nr.Obs
	Companies that adopt international disclosure standards											
Total assets (EUR bn.)	317.58	103.84	441.48	0	2247.6	56	407.31	225.33	554.23	0	2634.44	1650
Leverage	17.91	7.07	19.11	-0.12	63.07	56	15.39	7.13	15.32	-0.17	64.03	1650
Return on equity	1.53	0.49	2.49	-0.36	14.26	56	0.9	0.39	2.31	-13.4	17.56	1650
Amount outstanding (EUR bn.)	12.22	4.24	18.06	0.50	84.2	58	17.35	9.96	18.08	0.04	90.8	1883
Green bond share	42.95	25.48	40.44	0.19	100	58	42.59	30.77	40.05	0.02	100	1883
No. green bonds	3.83	2	5.19	1	28	58						
	Companies that do not adopt international disclosure standards											
Total assets (EUR bn.)	47.73	5.99	119.43	0.03	799.06	144	130.44	34.41	168.86	.03	1066.67	3339
Leverage	22.51	18.31	19.31	0	84.72	144	17.15	5.11	20.04	-32.94	88.28	3339
Return on equity	1.68	0.77	3.66	-9.02	16.74	138	1.04	.15	3.44	-47.23	44.1	3298
Amount outstanding (EUR bn.)	5.98	1.55	16.66	0	197.64	186	20.21	7.67	34.87	0	264.75	4584
Green bond share	48.48	34.07	38.45	0.94	100	186	37.54	20.25	36.43	0.05	100	4584
No. green bonds	3.42	1	14.16	1	189	186						
	All companies											
Total assets (EUR bn.)	123.29	12.2	280.84	0	2247.6	200	222.01	72.52	370.95	0	2634.44	4989
Leverage	21.22	13.32	19.31	-0.12	84.72	200	16.57	5.97	18.63	-32.94	88.28	4989
Return on equity	1.64	0.56	3.36	-9.02	16.74	194	0.99	0.23	3.11	-47.23	44.1	4948
Amount outstanding (EUR bn.)	7.46	1.85	17.17	0	197.64	244	19.38	8.5	30.96	0	264.75	6467
Green bond share	47.16	31.17	38.92	.19	100	244	39.01	21.41	37.58	0.02	100	6467
No. green bonds	3.52	2	12.61	1	189	244						

Table 3.5: Green bond issuer country characteristics

This table shows summary statistics related to the country-level characteristics of the green bond issuing companies. The top panel shows weighted (bond × quarter observation) statistics, the middle panel shows unweighted country-level summary statistics. The bottom panel shows unweighted summary statistics for the top ten green bond issuing countries. Together, these account for more than 95% of the euro area green bond market.

	Mean	Median	StdDev	Min	Max	Obs			
All issuer countries (euro area 17)									
Bonds outstanding (EUR bn.)	2324.14	2762.64	1062.47	0.99	3688.93	6467			
Green bond share (country)	2.26	2.20	1.28	0.01	6.30	6467			
Resolving insolvency score	80.22	79.20	9.76	45.4	93.90	3197			
Bonds outstanding (EUR bn.)	764.17	283.69	1006.04	1.16	2969.79	17			
Green bond share (country)	1.54	1.18	1.24	0.24	4.37	17			
Resolving insolvency score	73.13	78.26	14.87	45.44	92.93	16			
Issuer country	**Bonds outstanding (EUR Bn.)**			**Green bond share**			**Resolving insolvency score**		
	Mean	Median	StdDev	Mean	Median	StdDev	Mean	Median	StdDev
FR	2969.79	2871.07	353.12	1.52	1.29	1.20	73.07	74.6	5.40
NL	1238.20	1190.19	110.26	1.99	1.53	1.71	84.09	84.1	0.22
DE	2636.95	2543.67	266.00	0.87	0.53	0.89	91.11	91.6	0.95
ES	1531.70	1489.40	109.18	0.74	0.53	0.68	78.37	79.1	1.38
BE	568.36	564.70	44.21	1.59	1.42	0.52	83.32	83.9	1.17
IE	283.69	274.35	19.85	2.93	2.93	0.99	79.16	79.2	0.05
IT	2383.90	2321.25	143.50	0.29	0.10	0.39	76.66	76.6	0.61
LU	376.99	389.49	50.13	1.18	0.80	1.10	45.44	45.4	0.05
FI	213.56	204.24	30.70	1.69	1.43	1.27	92.93	92.8	0.41
PT	221.72	226.78	12.71	1.15	1.13	0.58	80.10	80.1	0.11

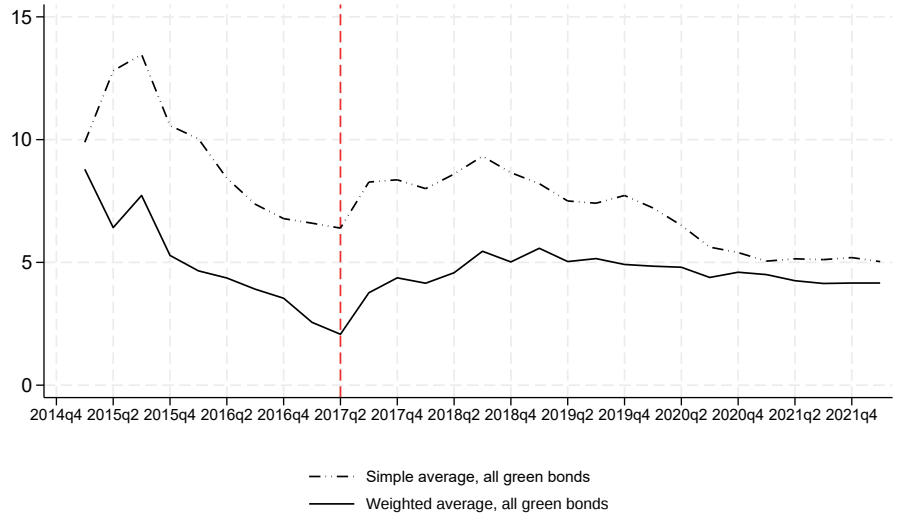
3.4 A first glance at green bond home bias and climate-related corporate disclosures

A first glance at the development of green bond home bias reveals an interesting, albeit ambiguous, pattern (see Figure 3.1). Between Q4 2014 and Q2 2017, home bias declines as the market expands and more companies from different euro area countries enter the market. This trend may reflect early supply limitations, with investors enjoying a competitive advantage in acquiring domestic green bonds. However, this downward trend halts in Q2 2017, after which home bias begins to rise again. A gradual decline resumes after Q3 2018. The reversal in Q2 2017 coincides with the introduction of the international climate-related disclosure standard. This temporal overlap raises the question whether the standard influenced the trend or whether other factors were at play.

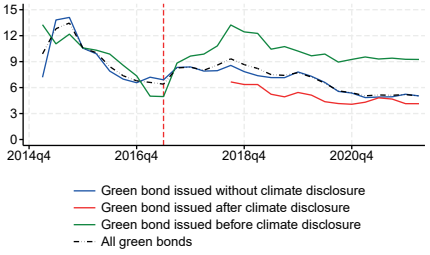
A closer look at panel (b) of Figure 3.1 and Table 3.2 suggests that companies might achieve lower green bond home bias after adopting the international disclosure standard. Prior to the second quarter of 2017, home bias levels were comparable across companies, regardless of their eventual decision to adopt the disclosure standard. After the second quarter of 2017, a divergence occurred in the levels of home bias. Companies that opted to adopt the standard during the observation period encountered higher levels of home bias for the green bonds they issued prior to adoption. Conversely, bonds issued post-adoption exhibited lower levels of home bias compared to both their pre-adoption counterparts and bonds from companies that chose not to adopt the standard.

It is possible, however, that other factors drive these observed trends. For example, a comparison of panels (b) and (c) of Figure 3.1 reveals that weighted average green bond home bias is lower than the simple average green bond home bias. This indicates that, generally, home bias is lower for green bonds with a larger issuance size. Furthermore, Tables 3.4 and 3.3 indicate that companies adopting the disclosure standard are, on average, substantially larger in terms of total assets. These companies have also issued more debt instruments and tend to issue bonds with longer maturities and larger issue sizes. Finally, Table 3.2 shows that home bias of green bonds issued in the ‘top three’ issuer countries is substantially lower, on average, than home bias of green bonds issued in other euro area countries.

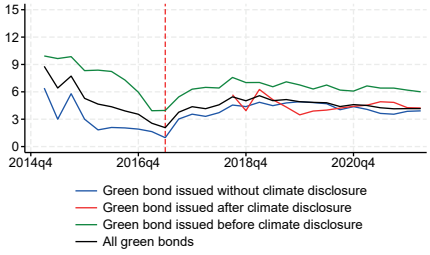
Figure 3.1: Green bond home bias over time



(a) Simple and weighted average green bond home bias



(b) Simple average green bond home bias



(c) Weighted average green bond home bias

Notes: This figure shows the development of green bond-level home bias over time. Panel (a) shows the simple unweighted average home bias of all green bonds outstanding in a certain quarter, as well as the weighted average home bias – where weights are based on the bonds' outstanding amount during a given quarter. Panel (b) zooms in on the simple average green bond-level home bias, and shows differences for the subsets of green bonds that were issued before the company adopted the international climate disclosure standards, green bonds that were issued after, and green bonds that were issued by companies that did not adopt the international disclosure standards during the observation window. Panel (c) shows the development of the weighted average home bias of green bonds per subset. Please note that the composition of the subset(s) of green bonds changes over time, as bonds are issued and mature during the observation window. Because the initial number of bonds is the total sample and subsets are small, averages are shown as per the fifth quarter from the first measurement quarter, to ensure a sufficiently large sample size and to avoid any potential confidentiality issues.

3.4.1 Methodology

To gain a better understanding of the relation between climate-related corporate disclosure and green bond home bias, I first estimate the following model using cross-sectional regression:

$$\overline{HB}_i = \beta ClimateDisclosure_i + \delta' \overline{X}_i + \epsilon_i \tag{3.2}$$

In Eq. 3.2, the dependent variable $\overline{HB}_i$ denotes the average investor home bias of a green bond issued by a euro area company over the entire observation period. The explanatory variable $ClimateDisclosure_i$ is a dummy variable that equals one if the green bond issuer adopts the international disclosure standard during the observation period, thereby committing to providing climate-related disclosures. The dummy equals zero if the company does not adopt the standard during the observation period. I include various issuer company and country controls, which are denoted in Eq. 3.2 by vector $\overline{X}_i$. Finally, the error term is denoted by ϵ_i. I run the regression for the entire sample of green bonds as well as for the sub-sample of 'low-risk' and 'high-risk' green bonds. I define 'low-risk' ('high-risk') bonds as those that have a yield to maturity and remaining maturity below (above) the median in my sample.[14] Moreover, I estimate the model for all green bonds in my sample, as well as for the subset of bonds issued by companies located in the top three issuer countries and other countries.

3.4.2 Results

The cross-sectional regression results, summarised in Table 3.6 and shown in more detail in Tables 3.13 through 3.16 in Appendix B, reveal that climate disclosure may be associated with lower levels of green bond home bias for 'low-risk' bonds and higher home bias for 'high-risk' bonds. The negative association between climate disclosure and 'low-risk' bonds is indicated by the negative regression coefficient in Columns (1), (4) and (7), which is statistically significant at the 1%–10% level, depending on the specification in Table 3.13. In the full model presented in Column (7), adopting the international climate-related disclosure standard is associated with a 4.7 percentage point lower level of green bond home bias. Although this only equals around one fourth to one third of the standard deviation, the impact can be deemed economically relevant, since the median home bias equals 1.1. Interestingly, climate-related disclosures seem to have a larger impact for green bonds that were issued outside the top three issuer countries, as can be gauged by comparing Columns (1)–(3) in Panels (II) and (III). However, the statistical significance is smaller compared to the result

[14] Yield to maturity is used as proxy for risk, as rating data are not available for a substantial part of the bonds in the dataset. However, there is a strong correlation between the bonds' yield to maturity and rating, where higher yields are observed for bonds with a lower credit rating.

found for green bonds issued by companies located in the top three issuer countries. This can be explained, at least in part, by the small number of observations outside the 'top three' issuer countries.

Likewise, the positive association between climate disclosures and green bond home bias for 'high-risk' bonds is indicated by the positive regression coefficient in columns (2), (5) and (8), which is statistically significant at the 1%–10% level, depending on the specification. In the full model presented in Column (8), climate disclosure is associated with a 10.2 percentage point higher level of green bond home bias. Although this is still less than one standard deviation, the effect can be deemed economically material compared to the median level of home bias. Again, the results seem to be driven by the dynamics outside the top three issuer countries.[15]

Two important caveats apply to these findings. First, although the observed relationship between climate disclosure and green bond home bias is economically material, it does not necessarily imply that firms with higher levels of green bond home bias face external funding constraints. Examining the direct relationship between home bias and firms' funding conditions is beyond the scope of this paper and is therefore left for future research.

Second, these findings should be interpreted with caution for several reasons. First, due to the small number of observations in the subset of bonds, the statistical power is limited, which leads to a higher chance of failing to detect a significant relation if such a relation exists. Moreover, the small number of observations makes the outcome sensitive to individual observations. Second, since bonds are 'grouped' together in companies, sectors and countries, errors are likely to be correlated within these clusters. If such a correlation exists, estimating the model with robust errors leads to overly narrow confidence intervals (see e.g. Chapter 8 of Angrist and Pischke (2009)). These two issues imply that the analysis simultaneously has a higher chance of Type II errors (failing to detect a true relation) and Type I errors (false positives).

Although clustering errors at, for example, the sectoral, country and sector-country level would mitigate the chance of Type I errors, my data inherently have a limited number of clusters, as I observe five sectors and 17 euro area countries (see Tables 3.14 to 3.16). Therefore, there is a chance that Type I errors remain even after clustering errors in the regression analysis. The statistically significant negative association between climate disclosure and home bias for 'low-risk' green bonds holds after clustering errors at the sectoral level in all specifications, and for the full model and after clustering errors at the issuer sector-country level. For green bonds issued by companies outside the top three green bond issuing countries, the positive and statistically significant relation for 'high-risk' bonds is robust against clustering errors at the issuer sector, country and sector-country level.

Table 3.6: Association between climate disclosure and green bond home bias

	Association between climate disclosure and green bond home bias								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bond risk type	Low	High	All	Low	High	All	Low	High	All
				All issuer countries					
Climate Disclosure	-2.5907	5.2344	0.2210	-3.7720	6.6440	0.2028	-4.7176	10.1885	0.2024
Robust		**		*	*		**	***	
Issuer sector	*			*			**		
Issuer country									
Issuer sector-country							*		
Observations	251	258	859	222	207	727	150	89	428
Adj. R-squared				0.240	0.110	0.129	0.495	0.419	0.387
				Top 3 issuer countries					
Climate Disclosure	-1.2074	-0.1547	-0.1093	-0.9832	0.2652	-0.0665	-1.1920	1.1779	-0.1930
Robust	***			**			***	**	
Issuer sector	***			**	**		**	**	
Issuer country	*						***	*	
Issuer sector-country	***			**			**	*	
Observations	192	195	634	180	155	543	120	62	327
R-squared	0.0462	0.0012	0.0005	0.2080	0.1801	0.1499	0.4457	0.4387	0.2503
				Other issuer countries					
Climate Disclosure	-9.9997	9.0604	-4.7078						
Robust	*	*							
Issuer sector	*	**							
Issuer country									
Issuer sector-country									
Observations	59	63	225						
Adj. R-squared	0.0156	0.0451	0.00282						
Issuer controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Issuer sector controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Issuer country controls	No	No	No	No	No	No	Yes	Yes	Yes
Robust errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors shown for different levels of clustering
*** p<0.01, ** p<0.05, * p<0.1

Notes: Continued on the next page.

Notes: This table summarises the cross-sectional regression results reported in Tables 3.13 to 3.16 in Appendix B of this chapter. The table reports the estimated regression coefficient for the relation between firms' adoption of the climate-related disclosure standard, denoted $ClimateDisclosure$, and green bond home bias. The results are shown for different subsets of bonds (859 bonds in the complete sample). Columns (1), (4) and (7) show the results for 'low-risk' bonds, which are bonds with both a below-median maturity and yield to maturity. Columns (2), (5) and (8) display results for 'high-risk' bonds, which are defined as having an above-median maturity and yield to maturity. Columns (3), (6) and (9) show results for all green bonds in my sample. The models shown in Columns (1)-(3) are estimated without covariates. The models in Columns (4)-(6) include issuer company and sector controls. These are the company's total assets (EUR bn.), leverage, return on assets, total amount of bonds outstanding (EUR bn.), the company's green bond share, sectoral dummies for 'non-financial company' or 'other' (the baseline are banks), and a dummy indicating whether the company belongs to a sector that is deemed to contribute highly to climate change. Columns (7)-(9) include issuer company, sector and country characteristics. The country characteristics are the issuer country's total amount outstanding in bonds, the country's green bond share and the country's resolving insolvency score. The table further documents whether the estimated coefficients are statistically significant when errors are clustered at different levels of aggregation. A statistically significant positive association is indicated by a green colour; a statistically significant negative association is indicated by a red colour. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively. The shade of green or red varies with the significance level of the estimated coefficient, with darker shades denoting a higher significance level. The models are shown for the complete sample (top panel), the top three green bond issuing countries (middle panel) and other countries (bottom panel).

[15] A few noteworthy observations emerge from the control variables, which are reported in Appendix B. First, for the sample covering all euro area countries, the full models (7)–(9) show a statistically and economically significant negative relationship between the size of a country's overall bond market and firms' green bond home bias. Additionally, for the subsample of 'low-risk' bonds, a country's share of the green bond market is negatively associated with firms' green bond home bias. Importantly, these links appear to be largely driven by countries with green bond markets that are still in earlier stages of development, outside the top three issuing countries. One possible explanation is that investors entering these emerging markets rely more on market-wide, aggregate information when making investment decisions and mitigate risk by selecting safer assets.

Second, in contrast, firm-level characteristics appear to be more relevant for green bonds issued by firms in the three largest issuing countries. In particular, firms with a larger presence in bond markets, as measured by total amount outstanding, tend to exhibit lower levels of green bond home bias. Similarly, firms with a higher share of green bonds in their total bond issuance also show lower home bias for their 'low-risk' green bonds. One possible explanation is that investors are more familiar with, have greater access to information about and place more trust in foreign firms with a stronger presence in the (green) bond market. At the same time, for 'low-risk' bonds, larger firms with stronger equity buffers in countries with robust insolvency frameworks exhibit higher levels of home bias. This somewhat surprising observation may reflect the fact that such firms are attractive not only to professional investors but also to less sophisticated domestic retail investors, who perceive these firms as relatively safe investments.

A third notable finding is the strong and statistically significant negative relationship between firms in sectors other than banking and non-financial corporates and the observed level of green bond home bias. This result is likely driven by firms issuing bonds through holding or financing companies located in international financial centres rather than in the country where their economic activities take place. Consequently, a bond may be recorded as originating from a foreign jurisdiction even though it is ultimately linked to a firm whose activities are based in the investors' home country. In such cases, the measured level of home bias understates the underlying economic home bias, as domestic investors may effectively be investing in domestic firms through foreign-issued securities.

3.5 Can companies attract foreign investors through voluntary climate disclosures?

The findings presented in Section 3.4 suggest that although a relation between climate-related corporate disclosures and green bond home bias may be present, at least a part of the observed correlation is likely explained by bond-level, issuer company and issuer country characteristics. In particular, home bias on average is higher for 'high-risk' bonds than 'low-risk' bonds. Home bias on average is also higher for green bonds issued in countries with a more nascent market (see Tables 3.13 through 3.16). In addition, companies that adopt the disclosure standard are substantially larger and have a larger presence in the bond markets (see Table 3.4).

In an attempt to better disentangle the effect of climate-related disclosure from the effect of such confounding factors, I apply two panel estimation techniques: two-way fixed effects and an event study based on a matched set of green bond issuing companies. Although in theory these methods improve the inference of the relation between climate-related disclosures and green bond home bias, the data limitations described in Section 3.4.2 reduce reliability of the results (see also Section 3.5.1).

3.5.1 Methodology

First, I use a two-way fixed effects estimation technique for panel data. Compared to the cross-sectional analysis presented in Section 3.4.1, this method better captures the relation between climate-related disclosure and home bias by controlling for time-invariant bond, issuer and issuer country characteristics and common shocks.[16] I estimate the following model:

$$HB_{it} = \beta ClimateDisclosure_{it} + \delta^{'} X_{it} + \alpha_i + \lambda_t + \epsilon_{it} \tag{3.3}$$

where HB_{it} represents the home bias of a certain green bond issued by a euro area company i at time t. The explanatory variable of interest, $ClimateDisclosure_{it}$, is a dummy variable as defined before. The bond fixed effect α_i conditions on any unobserved time-invariant heterogeneity that could cause selection bias in the estimated effect of climate disclosure on home bias. The time fixed effect λ_t controls for common time trends. To further control for any time-varying confounding factors, I subsequently extend the baseline model with issuer company and country characteristics, represented in Eq. 3.3 by vector X_{it}. Finally, the error

[16] In this regard, please note that my observation window includes the Covid-19 crisis, which was found to have an effect on home bias (Atrous and Abaoub, 2024).

term is denoted by ϵ_{it}. I run the model using both robust and clustered (at various levels) errors. To allow for comparison with the cross-sectional analysis, I estimate the model both for the complete dataset and for the subset of bonds issued by companies in the 'top three' and 'other' issuer countries.

Under certain conditions, this two-way fixed effects estimation provides an estimate for the average treatment effect on the treated; in my case, this would be the average effect of climate-related disclosures on home bias of green bonds issued by companies that adopt the disclosure standard. These conditions include, first, that investors do not anticipate whether green bond issuing companies intend to start providing climate-related information and, by implication, do not adjust their investment decisions beforehand. This seems a reasonable assumption. After all, it is unlikely that companies would announce the adoption of a voluntary standard in advance, for example in their financial reporting. Second, there should be no unobserved differences between companies that adopt the disclosure standard and those that do not, which may affect home bias for the green bonds they issue. Although this self-selection bias is mitigated to the extent that it stems from stable traits, it is likely that time-varying factors are also at play. After all, companies themselves decide whether and when to adopt the disclosure standard. Since not all companies that adopt the standard do so immediately, it is likely that company-specific time-varying factors play a role. Finally, this estimation method requires that the effect of corporate climate-related disclosures remains constant over time for a given company. While this seems a reasonable assumption given the relatively moderate time window of observation, note that any dynamics in the effect of disclosure on home bias, as well as the staggered adoption of the disclosure standard, can lead to less transparent and biased estimates.

Second, to mitigate self-selection bias as much as possible, I conduct an event study based on a matched set of companies. As a first step, I use propensity score matching to construct a matched sample of companies that are very similar in relevant, observable characteristics. I estimate the following matching equation using a logistic regression technique to obtain the propensity scores that indicate the likelihood that a company in my sample adopts the disclosure standard:

$$ClimateDisclosure_i = \beta' F_i + \delta_S' S_i + \delta_C' C_i + \epsilon_i \tag{3.4}$$

Equation 3.4 assumes that a company's propensity to adopt the climate-related disclosure standard, and thereby commit itself to providing climate-related disclosures, is determined by a set of time-invariant or averaged variables that represent firm (denoted by vector F), sector (S) and country (C) characteristics. The dependent variable, $ClimateDisclosure_i$,

represents a dummy variable that equals one if company i adopts the climate disclosure standard, as defined previously. The error term is denoted by ϵ_i.

I include the natural log of the companies' total assets, leverage as expressed as the ratio of equity over total assets and return on total assets as firm characteristics. As sectoral characteristics, I include dummy variables for non-financial companies and 'other financial companies', using banks as the baseline. In addition, I include a dummy that indicates whether the sector highly contributes to climate change. Finally, as a country characteristic, I include a dummy that indicates whether the country belongs to the top 25% (75th percentile) of countries with the highest resolving insolvency scores.[17]

The selection of these determinants for corporate disclosure is grounded in the existing literature. Ali, Frynas and Mahmood (2017) conducted a systematic literature review of 76 empirical studies on the drivers of corporate social responsibility disclosures and found that company size, industry and profitability are important factors. This could be indicative of firms strategically deciding whether and how much to disclose based on expected costs and benefits, for example obtaining favourable funding conditions by reducing uncertainty for investors (see e.g. Heinle and K. C. Smith (2017), Dhaliwal et al. (2011) and Cormier and Magnan (1999)). The effectiveness of corporate disclosures is furthermore found to depend on the nature of a country's governance and judicial systems (see e.g. Eichler (2012), Leuz, Lins and Warnock (2009), Aggarwal, Klapper and Wysocki (2005), Ahearne, Griever and Warnock (2004) and Bushman, Piotroski and A. J. Smith (2004)).

Using the estimated coefficients from Eq. 3.4, a propensity score is computed that indicates the likelihood that the company will adopt the climate disclosure standard, based on the company's attributes. Subsequently, I match the set of companies that at some point adopt the disclosure standard ('treated' group) with those that do not ('control' group), based on their propensity score. The objective is to construct a dataset of bond quarter-level observations comprising a 'treated' and a 'control' group of companies that are closely matched in observable characteristics. This ensures that the likelihood of a company adopting the disclosure standard cannot be reliably predicted based on its attributes. This improves the validity of the subsequent event study by reducing self-selection bias.

I use both nearest-neighbour (both one-to-one and one-to-three) and kernel matching methods and only consider observations that are in the range of common support. I use different matching methods because they each have their own advantages and disadvantages. Nearest-neighbour matching is conceptually straightforward and easy to interpret. A disadvantage is

[17]The mean value of the resolving insolvency score of the two years prior to the introduction of the climate disclosure standard equals 72.6, with a standard deviation of 13.8. The countries that are included in the 75th percentile based on these data are Finland, Germany, the Netherlands and Portugal.

that many observations are discarded, and therefore relevant information and variation in the data may be lost. A kernel matching technique mitigates this disadvantage because it creates synthetic matches based on all control observations in the data. However, as a consequence, this method is conceptually more complex and the results are less transparent.

As a second step, I estimate the following event study model for the matched sample of companies that follows from the matching procedure:

$$HB_{it} = \sum_{\tau=-q, q\neq 0}^{q} \beta_\tau ClimateDisclosure_{i\tau} + \delta^{'} X_{it} + \alpha_i + \lambda_t + \epsilon_{it} \tag{3.5}$$

In Eq. 3.5, the dependent variable HB_{it} represents the home bias associated with a company's green bond i in quarter t. The 'treatment' dummy variable, *Climate Disclosure*, equals one if the company adopts the disclosure standard and therefore has committed to providing climate-related disclosures, in period $\tau = 0$. The periods denoted by τ represent the coefficient for the lead and lag periods around the treatment quarter, τ_0. The treatment quarter τ_0 is omitted from the regression to avoid collinearity. For the estimation, I use six lead and six lag periods around the quarter in which the company adopts the climate-related disclosure standard. Vector X_{it} represents potential time-varying confounding factors at the company, sector or country level. The entity and time-fixed effects are denominated by α_i and λ_t, respectively, and ϵ_{it} denotes the error term.

A note on data limitations

Due to limitations in the available data, the empirical models employed to estimate the relation between corporate climate-related disclosures and green bond home bias may suffer from reduced reliability. First, regarding identification, this section highlighted the self-selection bias arising from the voluntary nature of the disclosure standard. An event study design using a matched sample of companies may mitigate this bias and improve identification of the effect of disclosure on home bias. However, the data structure limits the effectiveness of such a strategy. While the data contain a reasonable number of green bonds and variation – albeit somewhat limited – in whether issuer companies adopt the standard, only a small subset of firms actually adopted the disclosure standard before issuing green bonds (see Section 3.3). Because identifying the effect of disclosure on home bias requires observations both before and after adoption, the small number of pre-adoption observations hampers identification in an event study design. This constraint is compounded by the matching procedure, which further reduces the sample. Second, the nature of the data also poses challenges for inference. Since most adopting issuers begin issuing green bonds only after they have adopted the

standard, the number of bond-quarter observations available to estimate the disclosure-home bias relation is small. This reduces statistical power and makes it difficult to detect an effect, even if it is present. In addition, euro area green bond markets have developed unevenly over time and are concentrated in a few countries and sectors. If regression residuals are correlated within these countries and sectors, heteroscedasticity-robust standard errors fail to capture within-group dependence and may understate uncertainty, producing confidence intervals that are too narrow. Clustering standard errors at the appropriate level of aggregation can reduce this problem, but inference remains fragile because of the small number of clusters, which undermines the reliability of cluster-robust standard errors. In light of these limitations, I do not implement more computationally demanding identification strategies, such as staggered difference-in-differences estimators or synthetic control methods (see, e.g., Callaway and Sant'Anna (2021) and Borusyak, Jaravel and Spiess (2024)), which are better tailored to settings with staggered treatment adoption. Consequently, the results should be interpreted with caution, bearing in mind the inherent limitations of both the data and the empirical methods employed.

3.5.2 Results

Temporal and cross-sectional patterns in green bond investment

The two-way fixed effects estimation results provide insight into both the temporal and cross-sectional patterns in the relation between climate-related disclosures and green bond home bias. The results, summarised in Table 3.7 and presented in more detail in Tables 3.19 to 3.24, provide at best weak evidence of a negative relationship between climate-related disclosures and green bond home bias. In the baseline models, shown in Table 3.19, climate-related disclosures are associated with a 1.47 to 0.88 percentage point decrease in green bond home bias that is significant at the 1-5% level. Foreign investors' response to climate-related disclosures seems to differ depending on the jurisdiction of the disclosing company, where the effect is stronger for companies incorporated outside the top three green bond issuing countries. In fact, these 'other' countries seem to drive the main results. However, no overly strong conclusions can be drawn. Although it may be the case that the effect of climate-related disclosures on green bond home bias is heterogeneous across countries, the results are likely to a large extent driven by the limited number of companies that have issued green bonds before they adopt the disclosure standard (and which mature after the adoption of the standard) and the distribution of these observations across the two country subsets. The negligible *within* R^2 supports this notion. Most of the difference in home bias across green bonds seems

to be driven by common trends and time-invariant bond, company and country characteristics. This severely limits the potential for inference. Moreover, while the results are robust to clustering errors at the quarterly level (to account for common dynamics due, for example, to the Covid-19 crisis), they are not robust to clustering errors at the bond level.[18, 19]

[18]The significance of the results disappears too when errors are clustered at the company sector, country or country-sector level. This is surprising, since the number of clusters is small. Generally, a small number of clusters would lead to overly narrow confidence intervals, increasing the likelihood of (unwarranted) statistically significant results.

[19]With respect to the control variables, which are reported in Appendix B, several patterns emerge. For green bond issuers in the three largest issuing countries, increases in firm size are associated with lower green bond home bias, whereas higher returns on assets and larger amounts of bonds outstanding are associated with greater home bias. One possible explanation is that larger, better-performing firms with external financing needs are able to attract both foreign investors and domestic retail investors. By contrast, for issuers in other countries, growth in the domestic bond market is associated with lower green bond home bias, while firm growth is associated with higher home bias. This pattern may reflect information asymmetries: foreign investors may rely more heavily on overall market developments, whereas domestic investors may have a comparative advantage in assessing firm-specific characteristics and performance.

Table 3.7: Panel regression results on climate disclosure and green bond home bias

Association between climate disclosure and green bond home bias				
	(1)	(2)	(3)	(4)
			All countries	
Climate Disclosure	-1.4724	-1.4774	-1.2034	-0.8838
Robust	***	***	***	**
Bond				
Quarter	***	***	***	**
Issuer sector				
Issuer country				
Issuer sector-country				
Observations	6,405	6,405	4,855	4,855
Adj. R-squared		0.960	0.967	0.969
Adj. within R-squared		0.00402	0.0611	0.124
			Top 3 countries	
Climate Disclosure	-0.1139	-0.1137	0.1380	0.0946
Robust				
Bond				
Quarter				
Issuer sector				
Issuer country				
Issuer sector-country				
Observations	4,826	4,826	3,724	3,724
Adj. R-squared		0.829	0.832	0.834
Adj. within R-squared		-0.000268	0.0591	0.0730
			Other countries	
Climate Disclosure	-0.2007	-0.1999	-2.0439	-2.7873
Robust			*	***
Bond				
Quarter			**	**
Issuer sector			*	*
Issuer country				
Issuer sector-country				
Observations	1,578	1,578	1,130	1,130
Adj. R-squared		0.960	0.967	0.970
Adj. within R-squared		-0.00146	0.0492	0.122
Bond controls	No	Yes	Yes	Yes
Issuer controls	No	No	Yes	Yes
Issuer country controls	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Bond FE	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: This table summarises the panel regression results reported in Tables 3.19 to 3.24 in Appendix B of this chapter. The table reports the estimated regression coefficient for the relation between firms' adoption of the climate-related disclosure standard, denoted by $ClimateDisclosure$, and green bond home bias. Column (1) shows results for the model without covariates. Column (2) shows results for the model including bond controls, i.e. the bond's yield to maturity. . . . Continued on next page.

Notes: Column (3) shows results for the model including both bond and issuer company controls. These are the company's total assets (EUR bn.), leverage, return on assets, total amount of bonds outstanding (EUR bn.) and the company's green bond share. Column (4) shows results for the model including bond, issuer company and issuer country controls. The latter pertain to the issuer country's total amount outstanding in bonds, the country's green bond share and the country's resolving insolvency score. The table further documents whether the estimated coefficients are statistically significant when errors are clustered at different levels of aggregation. A statistically significant positive association is indicated by a green colour; a statistically significant negative association is indicated by a red colour. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively. The shade of green or red varies with the significance level of the estimated coefficient, with darker shades denoting a higher significance level. The models are shown for the complete sample (top panel), the top three green bond issuing countries (middle panel) and other countries (bottom panel).

Company characteristics and disclosure decision

Tables 3.8 and 3.9 show which observable characteristics at the issuer, sector and country level are significantly associated with an increased likelihood that a company adopts the climate-related disclosure standard. Notably, the results show that being larger in terms of total assets and belonging to the non-financial sector significantly increases a company's likelihood of adopting the climate-related disclosure standard. A 1% increase in total assets is estimated to increase a company's odds of adopting the climate disclosure standard by approximately 0.84. Especially companies that belong to the top 25% in terms of log total assets have a higher likelihood (probability >0.5) of adopting the disclosure standard. Moreover, being a non-financial company increases the likelihood of adopting the standard by about 5.25 times, although the average probability of non-financial companies adopting the standard is less than half during my observation period.[20] The estimated effect of company size is statistically significant at the 1% level and the effect of belonging to the non-financial sector is statistically significant at the 5% level. The data also reveal that companies that belong to the top 25% jurisdictions in terms of governance supporting the resolution of insolvency cases have a lower likelihood (on average 22% compared to 34%). This effect is estimated to be significant at the 5-10% level. Finally, the data suggest that companies with a higher share of green bonds prior to the introduction of the disclosure standard may have a higher likelihood of adopting it. These estimates are only weakly to moderately significant, though, and not robust to model specification. The overall explanatory power of the models ($pseudo - R^2$ of around 28%) can be deemed sufficient for the purpose of propensity score matching.

[20]The predicted probability of non-financial companies adopting the disclosure standard is around 41% compared to 20% for other types of companies, at mean values for the other covariates.

Table 3.8: Determinants of climate disclosure standard adoption (baseline)

Notes: This table provides results for regression eq. 3.4, which evaluates how various company, sector and country characteristics impact a company's propensity to adopt the climate disclosure standard. All the explanatory variables represent average values over the years 2015 and 2016, which constitute the two years prior to the introduction of the standard. The models are based on a logistic regression estimation and the coefficients represent the estimated increase in the log odds of the outcome per unit increase in the value of the explanatory variables. Please note that due to the sparseness of the data, the model could only be estimated based on 172-177 of the 244 companies, 50 of which adopted the standard at some point during the observation window. Robust standard errors are shown in parentheses. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively.

Climate Disclosure	(1)	(2)	(3)	(4)
Log Total Assets (EUR bn.)	0.6270***	0.8479***	0.8822***	0.8421***
	(0.1400)	(0.1698)	(0.1752)	(0.1730)
Leverage	0.0067	-0.0252	-0.0268	
	(0.0143)	(0.0161)	(0.0169)	
Return on assets	-0.0017	0.0001	-0.0003	
	(0.0022)	(0.0013)	(0.0015)	
Green bond share of the issuer	0.0243*	0.0252*	0.0227*	
	(0.0138)	(0.0130)	(0.0119)	
NFC		2.2424**	2.4865**	1.6587**
		(0.9532)	(0.9790)	(0.6523)
Other		0.7678	1.0267	0.7280
		(0.7836)	(0.8252)	(0.7443)
Highly contributes to climate change		-0.0724	0.1167	
		(0.8897)	(0.8551)	
Top Resolving Insolvency Score			-0.9135**	-0.8822**
			(0.4608)	(0.4055)
Constant	-3.0863***	-4.3244***	-4.2455***	-4.0719***
	(0.7576)	(1.3345)	(1.3090)	(0.9630)
Observations	172	172	172	177
Robust errors	Yes	Yes	Yes	Yes
Pseudo R-squared	0.228	0.280	0.302	0.286
Chi-squared	32.59	35.69	35.69	31.35
P-value	1.45e-06	8.30e-06	4.36e-05	2.60e-06

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.9: Determinants of climate disclosure standard adoption (robustness)

Notes: This table provides results for regression eq. 3.4, which evaluates how various company, sector and country characteristics impact a company's propensity to adopt the climate disclosure standard. All the explanatory variables represent average values over the years 2015 and 2016, which constitute the two years prior to the introduction of the standard. The models are based on a logistic regression estimation and the coefficients represent the estimated increase in the log odds of the outcome per unit increase in the value of the explanatory variables. Please note that due to the sparseness of the data, the model could only be estimated based on 172-177 of the 244 companies, 50 of which adopted the standard at some point during the observation window. Clustered standard errors at the issuer sector-country level are shown in parentheses. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively.

Climate Disclosure	(1)	(2)	(3)	(4)
Log Total Assets (EUR bn.)	0.6270***	0.8479***	0.8822***	0.8421***
	(0.1763)	(0.1736)	(0.1824)	(0.1831)
Leverage	0.0067	-0.0252	-0.0268	
	(0.0191)	(0.0214)	(0.0230)	
Return on assets	-0.0017	0.0001	-0.0003	
	(0.0021)	(0.0011)	(0.0014)	
Green bond share of the issuer	0.0243*	0.0252**	0.0227**	
	(0.0130)	(0.0106)	(0.0105)	
NFC		2.2424**	2.4865**	1.6587**
		(1.0115)	(0.9681)	(0.6625)
Other		0.7678	1.0267	0.7280
		(0.9806)	(0.9476)	(0.8917)
Highly contributes to climate change		-0.0724	0.1167	
		(0.9152)	(0.9292)	
Top Resolving Insolvency Score			-0.9135	-0.8822*
			(0.5640)	(0.4827)
Constant	-3.0863***	-4.3244***	-4.2455***	-4.0719***
	(0.9412)	(1.3374)	(1.3539)	(1.0170)
Observations	172	172	172	177
Clustered errors	Yes	Yes	Yes	Yes
Pseudo R-squared	0.228	0.280	0.302	0.286
Chi-squared	22.42	33.96	25.87	25.41
P-value	0.000166	1.75e-05	0.00110	4.16e-05
Nr Clusters	34	34	34	34

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Addressing self-selection bias

Based on the above findings and the criterion to include at least one company, one sector and one country-level characteristic, I use the reduced model (presented in Column (4) of Table 3.9) to balance my dataset for the purpose of conducting an event study.[21] In line with the findings presented in Section 3.4, Table 3.10 shows that in the original data, the group of companies that adopt the climate disclosure standard is on average substantially larger (EUR 4.3 bn.) than the companies that do not (EUR 1.6 bn.). In addition, both non-financial companies and other financial companies are underrepresented (and banks overrepresented) in the group of adopters. These characteristics strongly predict whether a company adopts the disclosure standard, as indicated by the $pseudo - R^2$ test statistics of 0.265.[22]

All matching procedures resulted in an improved balance of company, sector and country characteristics. For the nearest-neighbour matching procedures, the balance was improved to an extent where the characteristics no longer significantly predict the adoption of the disclosure standard. The one-to-one matching procedure performed the best, removing almost all bias as indicated by a $pseudo - R^2$ of 0.000 and a mean bias of 0.56%. The one-to-three matching procedure reduced the sample bias to around 8.07% with a corresponding $pseudo - R^2$ of 0.013. This suggests that the matching procedure successfully reduced systematic differences between the treated and control groups. In contrast, kernel matching was unable to reduce sample bias below 10%, which is the commonly accepted threshold for adequate balance. In sum, the results suggest that nearest-neighbour matching achieves a satisfactory level of covariate balance, which will improve the validity of subsequent event study analysis to the extent possible given the other data limitations described in Section 3.5.1.

Although the one-to-one nearest-neighbour matching achieves the best level of balance, I choose to use the one-to-three matching procedure as a baseline for the subsequent event study. The rationale behind this choice is that this method optimally reconciles the objectives of achieving balance and preserving the maximum number of observations (see Tables 3.11 and 3.12 for a description of the matched data sample).

[21] I chose to exclude the variable 'Green bond share of the issuer' from the reduced matching model due to its generally weak to moderate statistical significance, which was not robust across model specifications. Including this variable in the reduced model did not substantially enhance the model's overall explanatory power. Should this variable be included in the reduced model, it would lack significance in the specification with robust errors and achieve significance only at the 10% level in the specification with clustered errors at the sector-country level. Given its limited variability, with merely 38 out of 177 companies evidencing a non-zero value, the inclusion of this variable would contribute minimal information to the matching procedure and potentially lead to cases that are challenging to match. This could adversely affect the quality of the matching, particularly in light of the constrained sample size.

[22] This result is consistent with the findings presented in Table 3.9.

Table 3.10: Covariate balance before and after matching for disclosure standard adoption

Variable	Sample	Mean		Bias		T-test		
		Treated	Control	Percent Bias	Reduction	t	p>t	Normalised Difference
Log Total Assets (EUR bn)	Raw	4.3143	1.6493	115.8		6.63	0.000	8.6464
	Matched (nn1)	3.1969	3.2486	-2.6	98.1	-0.09	0.925	-0.0954
	Matched (nn3)	3.9456	3.8604	4.3	96.8	0.20	0.843	0.2395
	Matched (kernel)	3.9456	3.8117	6.7	95.0	0.30	0.762	0.4877
NFC	Raw	0.4400	0.5118	-14.3		-0.86	0.392	-1.4490
	Matched (nn1)	0.4815	0.4815	0.0	100.0	0.00	1.000	0.0000
	Matched (nn3)	0.4524	0.4722	-3.9	72.4	-0.18	0.857	-0.2682
	Matched (kernel)	0.4524	0.4577	-1.1	92.6	-0.05	0.962	-0.1048
OTHER	Raw	0.1000	0.2126	-31.2		-1.76	0.081	-2.9410
	Matched (nn1)	0.0741	0.0741	0.0	100.0	-0.00	1.000	0.0000
	Matched (nn3)	0.0714	0.1429	-23.0	36.6	-1.05	0.296	-1.4507
	Matched (kernel)	0.0714	0.1905	-35.6	-5.8	-1.62	0.108	-3.2534
Top Resolving Insolvency Score	Raw	0.3600	0.5118	-30.8		-1.83	0.069	-3.0835
	Matched (nn1)	0.4815	0.4815	0.0	100.0	0.00	1.000	0.0000
	Matched (nn3)	0.4286	0.4524	-4.7	84.3	-0.22	0.829	-0.3230
	Matched (kernel)	0.4286	0.4437	-3.0	90.1	-0.14	0.891	-0.3007

		Pseudo R2	p>Chi2	Mean Bias	Median Bias
Model	Raw	0.276	0.000	48.025	30.981
	Matched (nn1)	0.000	1.000	0.562	0.000
	Matched (nn3)	0.013	0.826	8.068	4.390
	Matched (kernel)	0.028	0.518	10.731	4.439

Notes: This table documents the outcome of the propensity score matching procedure for the companies in the sample based on the predicted probabilities derived from the logistic regression model presented in Column (4) of Table 3.9. For each of the explanatory variables, the table shows mean values for the companies that adopt the climate disclosure standard (Treated) and those that do not (Control). These values are shown for the raw (unmatched) sample, as well as for the matched sample based on a nearest neighbour (1 and 3 matches) and kernel matching procedure. Both matching procedures only use observations on common support. The maximum distance between matched observations (caliper) was set to 0.05. The nearest neighbour matching procedure was performed without replacement for the one-to-one match variant. . . . *Continued on next page*

Notes: The table also presents the percent 'bias' between the Treated and Control group and the reduction achieved after matching. This indicates the level of balance that is achieved on the characteristics of the companies that do and those that do not adopt the disclosure standard. The T-test statistic indicates whether the differences between the Treated and Control group are significantly different from zero. Normalised differences represent an additional metric. It is a scale-free measure of the difference in distributions and calculated as 'the difference in averages by treatment status, scaled by the square root of the sum of the variances' (Imbens and Wooldridge, 2009). Finally, the lower part of the table provides statistics for the overall performance of the matching procedure in reducing imbalances in the Treated and Control group. The Pseudo R2 is derived from probit estimation of the propensity scores on all the matching variables. The corresponding P-values represent the outcome for the likelihood-ratio test of the joint insignificance of all the regressors.

Table 3.11: Company sample composition after matching

This table provides an overview of the company data sample after matching (as presented in Table 3.10). For each matching procedure, the table documents how many of the 244 companies (58 of which adopt the climate disclosure standard) were excluded in a first step of the matching procedure. Companies can be excluded, for instance, because their propensity score did not fall within the common support, or because information on covariates was missing in relation to the regression presented in Column (4) of Table 3.9. The table also documents how many of the included companies adopt the climate-related disclosure standard and the number that are selected as closest matches in the second step. Likewise, it reports the number of included companies that do not adopt the disclosure standard and how many of those companies are assigned a positive weight and are thus included in the matched sample.

Matching procedure	Excluded	Included - No. adopters	Of which receive weight >0	Included - No. non-adopters	Of which receive weight >0
Nearest neighbour one-to-one (nn1)	67	50	27	127	27
Nearest neighbour one-to-three (nn3)	67	50	42	127	55
Kernel	67	50	42	127	127

Table 3.12: Matched data sample description for the event study

This table provides information about the matched data sample used for the regression estimations shown in Tables 3.29 through 3.31. For each of the four models of Tables 3.29 through 3.31, the table shows the number of observations (bond × quarter), companies and green bonds in the sample, split by whether the observation pertains to a company that does or does not adopt the disclosure standard. Please note that because the panel dataset is unbalanced, there is some additional observation drop in the event study regression estimation, leading to some discrepancies in the number of companies in the group of non-adopters (comparing Column (5) from Table 3.11 to Columns (2), (4) and (6) from this table).

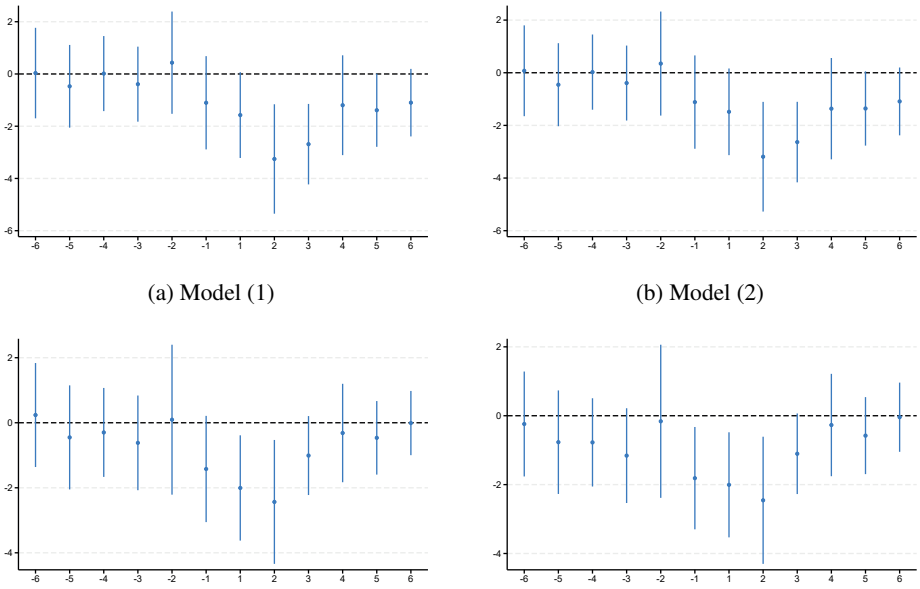
	Unmatched Data Sample	Matched Data Sample					
		NN1		NN3		Kernel	
Adopters disclosure standard?		No	Yes	No	Yes	No	Yes
		Event study model (1)					
No. of observations	6467	1695	909	2552	1351	3919	1351
No. of companies	244	25	27	53	42	125	42
No. of green bonds	859	243	119	327	162	498	162
Of which issued prior to adoption	46	0	14	0	30	0	30
		Event study model (2)					
No. of observations	6467	1695	909	2562	1351	3919	1351
No. of companies	244	25	27	53	42	125	42
No. of green bonds	859	243	119	327	162	498	162
Of which issued prior to adoption	46	0	14	0	30	0	30
		Event study model (3)					
No. of observations	6467	1362	795	1999	1197	3127	1197
No. of companies	244	24	27	50	42	116	42
No. of green bonds	859	211	111	283	151	426	151
Of which issued prior to adoption	46	0	14	0	30	0	30
		Event study model (4)					
No. of observations	6467	1362	795	1999	1197	3127	1197
No. of companies	244	24	27	50	42	116	42
No. of green bonds	859	211	111	283	151	426	151
Of which issued prior to adoption	46	0	14	0	30	0	30

Foreign investor response to voluntary corporate climate-related disclosures

The event study corroborates the findings presented in Section 3.5.2 and suggests that, at best, there is a weak indication that companies can attract foreign investors by adopting the voluntary climate-related disclosure standard. Tables 3.28 to 3.30 in Appendix B, along with Figures 3.2 (below) and 3.3 and 3.4 in Appendix B, indicate that prior to the adoption of the disclosure standard, the degree of home bias in green bonds from companies adhering to the standard was not significantly different from home bias in green bonds from companies that did not adopt the standard. Upon implementing the disclosure standard, companies notice a decrease in green bond home bias relative to those that do not adopt the standard. However, this effect seems temporary and dissipates around two quarters after adoption. The impact of climate-related disclosures is statistically significant at the 1-5% level in the initial quarters when using models with robust standard errors, as well as when clustering errors at the bond level. However, this significance is not observed when errors are clustered at the sector-country level. The lack of statistical significance when errors are clustered at a more aggregated level suggests that the observed effect of climate-related disclosures may lack robustness or consistency across various sectors or countries, thereby challenging the findings' generalisability. The analysis is further limited by the concentration of observations within a few countries, as well as a small sample size, both overall and regarding the number of cases with observable home bias before and after adopting the disclosure standard.

As an additional robustness check, I implemented the event study utilising both the one-to-one nearest-neighbour and the kernel matching methods. Table 3.28 in Appendix B to this chapter presents the results of the one-to-one matching process, revealing that climate-related disclosure does not significantly affect green bond home bias. The results obtained through the kernel matching technique (available in an online appendix) correspond closely to those achieved using the one-to-three nearest-neighbour matching approach.

Figure 3.2: Event study results



(a) Model (1)

(b) Model (2)

(c) Model (3)

(d) Model (4)

Notes: This figure visualises the results of the event study presented in Table 3.28, where the model was estimated based on a matched set of companies using nearest neighbour (3) matching and where the event study was estimated using robust standard errors. Panels (1) through (4) of this figure correspond to the regression model specifications in Columns (1) through (4) in Table 3.28. The figure shows the estimated effect of a company's adoption of the disclosure standard on investor home bias for the green bonds issued by the adopting company. The Y-axis represents the change in green bond-level home bias. The X-axis represents the six lead and lag periods around the quarter (T0) in which the company chooses to adopt the disclosure standard and in doing so commits itself to start providing climate-related disclosures. Note that T0 is omitted in the graphs.

3.6 Conclusions and discussion

In this study, I analysed whether voluntary climate-related corporate disclosures influence investor home bias in the euro area green bond market. My data included 859 green bonds issued by 244 euro area companies across 17 euro area countries. Of these companies, 58 (who collectively issued 222 green bonds) adopted a new international climate disclosure standard that was introduced in 2017 during the observation window (Q1 2014 to Q1 2022).

A preliminary exploration of the data, combined with cross-sectional regression analysis, suggests that the relationship between climate disclosure and green bond home bias is nuanced. Green bond home bias appears to depend on local green bond market development as well as on firm- and bond-level characteristics. Moreover, substantial differences exist between firms that adopt the disclosure standard and those that do not. Adopters tend to be larger and issue greater volumes of bonds, which are characterised by longer maturities and larger issue sizes. The relationship between adoption of the climate disclosure standard and the home bias observed in firms' green bond issuances also appears to be context dependent. In particular, I find a negative association between disclosure and home bias for 'low-risk' bonds but a positive association for 'high-risk' bonds. These patterns seem to be driven primarily by local green bond markets at earlier stages of development, where home bias is comparatively high.

Subsequently, in a second step, I use various panel data regression techniques to investigate whether voluntary climate-related corporate disclosures can help companies attract foreign investors. Using two-way fixed effects regression, I find only limited evidence of a negative association between climate-related disclosures and green bond home bias. Again, these findings appear to be driven by countries with green bond markets in earlier stages of development. Through an event study based on a matched sample of companies, I show that the reduction in green bond home bias following the adoption of climate-related disclosure standards is at best small and temporary, dissipating within a few quarters after adoption.

My findings suggest that corporate climate-related disclosures may enhance cross-border investment; however, their impact and efficacy are likely contingent upon structural characteristics at both the company and bond levels, as well as local market conditions and development. This is consistent with the mixed evidence reported in the literature, where both diversification (e.g. Eichler (2012), Leuz, Lins and Warnock (2009), Dahlquist et al. (2003), Gelos and Wei (2005), Bradshaw, Bushee and Miller (2004), Aggarwal, Klapper and Wysocki (2005) and Ahearne, Griever and Warnock (2004)) and specialisation (e.g.Van Nieuwerburgh and Veldkamp (2009), Coval and Moskowitz (1999) and Ivkovic and Weisbenner (2005)) behaviour is observed.

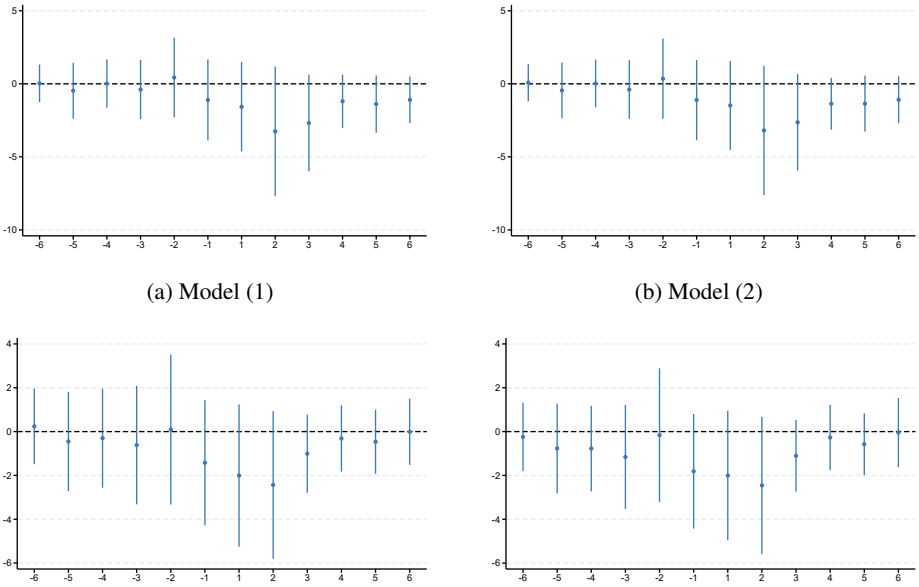
It is important to recognise that the findings of this study should be interpreted with caution due to the limitations of my dataset. These limitations include the limited number of green bonds issued prior to a company's adoption of the disclosure standard and the concentration of green bonds in a select number of countries with more advanced green bond markets.

Nevertheless, my results may be of interest to European regulators. Over the past few years, new legislation has been adopted in the EU that mandates corporate climate-related disclosures in an attempt to help investors fund the EU's transition to a climate-neutral economy. The adopted regulations are currently being amended with a view to simplification and burden reduction. This includes a substantial scope reduction for corporate sustainability reporting, leaving only the largest corporations in scope. My findings suggest that focusing policy on the largest corporations is in line with current voluntary disclosure practice. In the future, regulators could consider further tailoring policies by sector and market segment to maximise the impact of disclosures on investor behaviour while maintaining a targeted approach.

Future research could investigate whether and under which conditions corporate disclosures reduce, or increase, investor home bias, using quasi-experiments in the context of regulatory shocks. The challenge would be to identify regulatory events that are both sufficiently isolated from other reforms and substantial enough to have a material impact on investors' portfolio allocation. Arguably, voluntary climate-related disclosures in isolation may not be material enough to tilt the balance for the aggregate pool of investors. It would therefore also be worthwhile to further examine whether the effectiveness of voluntary disclosure varies by investor type and whether changes in information availability lead to portfolio rebalancing over time. Finally, future research could study whether and to what extent home bias materially affects companies' external funding conditions.

Appendix A: Figures

Figure 3.3: Event study results (robustness, NN3 matched sample, clustered errors at sector-country level)



(a) Model (1)

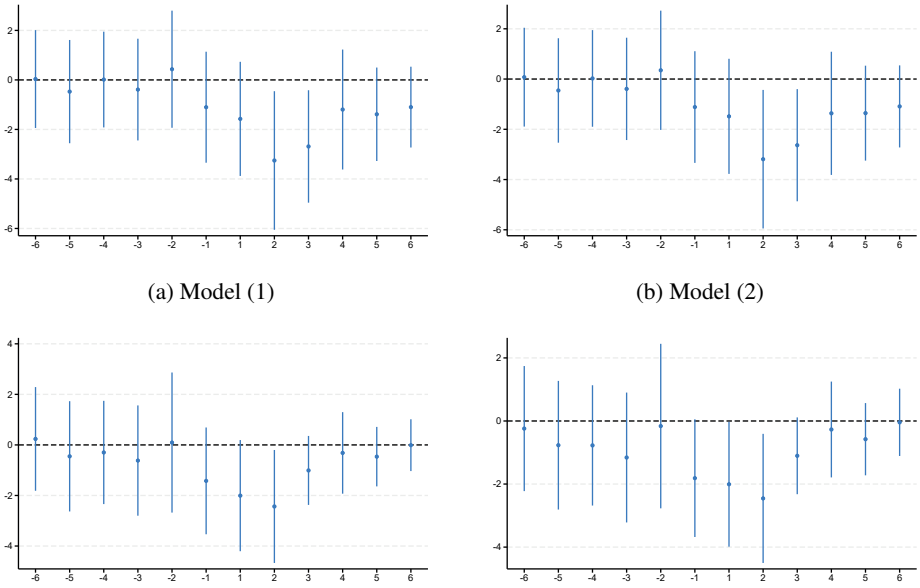
(b) Model (2)

(c) Model (3)

(d) Model (4)

Notes: This figure visualises the results of the event study presented in Table 3.29, where the model was estimated based on a matched set of companies using nearest neighbour (3) matching and where the event study was estimated using robust standard errors that are clustered at the issuer sector-country level. Panels (1) through (4) of this figure correspond to the regression model specifications in Columns (1) through (4) in Table 3.29. The figure shows the estimated effect of a company's adoption of the disclosure standard on investor home bias for the green bonds issued by the adopting company. The Y-axis represents the change in green bond-level home bias. The X-axis represents the six lead and lag periods around the quarter (T0) in which the company chooses to adopt the disclosure standard and in doing so commits itself to start providing climate-related disclosures. Note that T0 is omitted in the graphs.

Figure 3.4: Event study results (robustness, NN3 matched sample, clustered errors at bond level)



(a) Model (1)

(b) Model (2)

(c) Model (3)

(d) Model (4)

Notes: This figure visualises the results of the event study presented in Table 3.30, where the model was estimated based on a matched set of companies using nearest neighbour (3) matching and where the event study was estimated using robust standard errors that are clustered at the bond level. Panels (1) through (4) of this figure correspond to the regression model specifications in Columns (1) through (4) in Table 3.30. It shows the estimated effect of a company's adoption of the disclosure standard on investor home bias for the green bonds issued by the adopting company. The Y-axis represents the change in green bond-level home bias. The X-axis represents the six lead and lag periods around the quarter (T0) in which the company chooses to adopt the disclosure standard and in doing so commits itself to start providing climate-related disclosures. Note that T0 is omitted in the graphs.

Appendix B: Tables

Cross-section regression results

Tables 3.13 to 3.16 provide regression results pertaining to Eq. 3.2, which indicates the relation between corporate climate-related disclosures and green bond-level home bias based on a cross-section estimation technique. The results are shown for different subsets of bonds (859 bonds in complete sample). Columns (1), (4) and (7) show the results for 'low-risk' bonds, which are bonds with both a below-median maturity and yield to maturity.[23] Columns (2), (5) and (8) display results for 'high-risk' bonds, which are defined as having an above-median maturity and yield to maturity. Columns (3), (6) and (9) show results for all green bonds in my sample. The models shown in Columns (1)-(3) are estimated without covariates. The models in Columns (4)-(6) include issuer company and sector controls. These are the company's total assets (EUR bn.), leverage, return on assets, total amount of bonds outstanding (EUR bn.) and green bond share, sectoral dummies for 'non-financial company' or 'other' (the baseline is banks), and a dummy indicating whether the company belongs to a sector that is deemed to contribute highly to climate change. Coefficients and errors for covariates are omitted for readability but can be viewed in the online annex. Columns (7)-(9) include issuer company, sector and country characteristics. The country characteristics are the issuer country's total amount outstanding in bonds, the country's green bond share and the country's resolving insolvency score. Robust standard errors are shown in parentheses. Table 3.13 is estimated using heteroscedasticity-robust standard errors and Tables 3.14 through 3.16 use clustered errors at the issuer sector, issuer country and issuer sector-country level, respectively. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively. The models are shown for the complete sample (top panel), the top three green bond issuing countries (middle panel) and other countries (bottom panel). For readability and ease of comparison, Tables 3.13 to 3.16 do not show the coefficients for covariates. Instead, these are reported in Table 3.17 for models (1) through (9) for all issuer countries and in Table 3.18 for models (1) through (9) for the top three issuer countries. Due to the limited data sample for other issuer countries, it was not possible to estimate the models with covariates.

[23] Yield to maturity is used as a proxy for risk, as rating data were not available for a substantial part of the bonds in the dataset. However, there is a strong correlation between the bonds' yield to maturity and rating, where higher yields are observed for bonds with a lower credit rating.

Table 3.13: Association between climate disclosure and green bond home bias (baseline)

Notes: This table provides regression results pertaining to Eq. 3.2, estimated using robust standard errors.

	Association between climate disclosure and green bond home bias								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bond risk type	Low	High	All	Low	High	All	Low	High	All
					All issuer countries				
Climate Disclosure	-2.5907	5.2344**	0.2210	-3.7720*	6.6440*	0.2028	-4.7176**	10.1885***	0.2024
	(1.6123)	(2.2940)	(1.0945)	(2.2745)	(3.4998)	(1.3069)	(2.3659)	(2.7348)	(1.2394)
Observations	251	258	859	222	207	727	150	89	428
R-squared	0.0062	0.0490	0.0000	0.2710	0.1493	0.1401	0.5356	0.4985	0.4040
Adj. R-squared				0.240	0.110	0.129	0.495	0.419	0.387
					Top 3 issuer countries				
Climate Disclosure	-1.2074***	-0.1547	-0.1093	-0.9832**	0.2652	-0.0665	-1.1920***	1.1779**	-0.1930
	(0.3003)	(0.3012)	(0.1747)	(0.3809)	(0.2845)	(0.2100)	(0.3507)	(0.5293)	(0.2403)
Observations	192	195	634	180	155	543	120	62	327
R-squared	0.0462	0.0012	0.0005	0.2080	0.1801	0.1499	0.4457	0.4387	0.2503
Adj. R-squared				0.166	0.129	0.136	0.383	0.301	0.222
					Other issuer countries				
Climate Disclosure	-9.9997*	9.0604*	-4.7078						
	(5.6587)	(5.1354)	(3.2409)						
Observations	59	63	225						
R-squared	0.0326	0.0590	0.0075						
Issuer controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Issuer sector controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Issuer country controls	No	No	No	No	No	No	Yes	Yes	Yes
Robust errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.14: Association between climate disclosure and green bond home bias (robustness - clustered errors at sector level)

Notes: This table provides regression results pertaining to Eq. 3.2, estimated using clustered errors at the issuer sector level.

	Association between climate disclosure and green bond home bias								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bond risk type	Low	High	All	Low	High	All	Low	High	All
					All issuer countries				
Climate Disclosure	-2.5907*	5.2344	0.2210	-3.7720*	6.6440	0.2028	-4.7176**	10.1885	0.2024
	(0.9901)	(2.4585)	(1.5419)	(0.9466)	(4.0234)	(2.0051)	(0.7649)	(6.5663)	(2.8289)
Observations	251	258	859	222	207	727	150	89	428
R-squared	0.0062	0.0490	0.0000	0.2710	0.1493	0.1401	0.5356	0.4985	0.4040
Adj. R-squared				0.240	0.110	0.129	0.495	0.419	0.387
No. Clusters	4	4	5	3	4	4	3	4	4
					Top 3 issuer countries				
Climate Disclosure	-1.2074**	-0.1547	-0.1093	-0.9832**	0.2652**	-0.0665	-1.1920**	1.1779*	-0.1930
	(0.1250)	(0.1435)	(0.3582)	(0.1957)	(0.0721)	(0.2817)	(0.1696)	(0.3877)	(0.2498)
Observations	192	195	634	180	155	543	120	62	327
R-squared	0.0462	0.0012	0.0005	0.2080	0.1801	0.1499	0.4457	0.4387	0.2503
Adj. R-squared				0.166	0.129	0.136	0.383	0.301	0.222
No. Clusters	3	4	4	3	4	4	3	4	4
					Other issuer countries				
Climate Disclosure	-9.9997*	9.0604**	-4.7078						
	(3.4865)	(2.7427)	(4.0437)						
Observations	59	63	225						
R-squared	0.0326	0.0590	0.0075						
No. Clusters	4	4	5						
Issuer controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Issuer sector controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Issuer country controls	No	No	No	No	No	No	Yes	Yes	Yes

Clustered standard errors (issuer sector level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.15: Association between climate disclosure and green bond home bias (robustness - clustered errors at country level)

Notes: This table provides regression results pertaining to Eq. 3.2, estimated using clustered errors at the issuer country level.

	Association between climate disclosure and green bond home bias								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bond risk type	Low	High	All	Low	High	All	Low	High	All
					All issuer countries				
Climate Disclosure	-2.5907	5.2344	0.2210	-3.7720	6.6440	0.2028	-4.7176	10.1885	0.2024
	(3.0576)	(3.8180)	(1.9013)	(3.1700)	(5.6854)	(1.9867)	(2.8765)	(7.0149)	(1.7090)
Observations	251	258	859	222	207	727	150	89	428
R-squared	0.0062	0.0490	0.0000	0.2710	0.1493	0.1401	0.5356	0.4985	0.4040
Adj. R-squared				0.240	0.110	0.129	0.495	0.419	0.387
No. Clusters	14	12	17	13	12	17	11	11	16
					Top 3 issuer countries				
Climate Disclosure	-1.2074*	-0.1547	-0.1093	-0.9832	0.2652	-0.0665	-1.1920***	1.1779*	-0.1930
	(0.3130)	(0.1802)	(0.2027)	(0.4528)	(0.2347)	(0.1225)	(0.1039)	(0.2895)	(0.3692)
Observations	192	195	634	180	155	543	120	62	327
R-squared	0.0462	0.0012	0.0005	0.2080	0.1801	0.1499	0.4457	0.4387	0.2503
Adj. R-squared				0.166	0.129	0.136	0.383	0.301	0.222
No. Clusters	3	3	3	3	3	3	3	3	3
					Other issuer countries				
Climate Disclosure	-9.9997	9.0604	-4.7078						
	(8.1640)	(8.3459)	(5.2093)						
Observations	59	63	225						
R-squared	0.0326	0.0590	0.0075						
Adj. R-squared									
No. Clusters	11	9	14						
Issuer controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Issuer sector controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Issuer country controls	No	No	No	No	No	No	Yes	Yes	Yes

Clustered standard errors (issuer country level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.16: Association between climate disclosure and green bond home bias (robustness - clustered errors at sector-country level)

Notes: This table provides regression results pertaining to Eq. 3.2, estimated using clustered errors at the issuer sector-country level.

	Association between climate disclosure and green bond home bias								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bond risk type	Low	High	All	Low	High	All	Low	High	All
					All issuer countries				
Climate Disclosure	-2.5907	5.2344	0.2210	-3.7720	6.6440	0.2028	-4.7176*	10.1885	0.2024
	(2.9849)	(3.4106)	(1.9092)	(3.3102)	(5.3848)	(2.2181)	(2.6940)	(6.2151)	(1.9523)
Observations	251	258	859	222	207	727	150	89	428
R-squared	0.0062	0.0490	0.0000	0.2710	0.1493	0.1401	0.5356	0.4985	0.4040
Adj. R-squared				0.240	0.110	0.129	0.495	0.419	0.387
No. Clusters	26	28	41	24	25	36	19	19	32
					Top 3 issuer countries				
Climate Disclosure	-1.2074***	-0.1547	-0.1093	-0.9832**	0.2652	-0.0665	-1.1920***	1.1779*	-0.1930
	(0.2060)	(0.3337)	(0.2476)	(0.3706)	(0.3133)	(0.2046)	(0.1376)	(0.5504)	(0.2490)
Observations	192	195	634	180	155	543	120	62	327
R-squared	0.0462	0.0012	0.0005	0.2080	0.1801	0.1499	0.4457	0.4387	0.2503
Adj. R-squared				0.166	0.129	0.136	0.383	0.301	0.222
No. Clusters	9	11	11	9	10	11	7	9	11
					Other issuer countries				
Climate Disclosure	-9.9997	9.0604	-4.7078						
	(8.1024)	(7.7879)	(5.2862)						
Observations	59	63	225						
R-squared	0.0326	0.0590	0.0075						
No. Clusters	17	17	30						
Issuer controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Issuer sector controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Issuer country controls	No	No	No	No	No	No	Yes	Yes	Yes

Clustered standard errors (issuer sector-country level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.17: Supplement to Table 3.6: control variable estimates for the sample of all issuer countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Climate Disclosure	-2.5907	5.2344	0.2210	-3.7720	6.6440	0.2028	-4.7176	10.1885	0.2024
Robust	(1.6123)	(2.2940)**	(1.0945)	(2.2745)*	(3.4998)*	(1.3069)	(2.3659)**	(2.7348)***	(1.2394)
Issuer sector	(0.9901)*	(2.4585)	(1.5419)	(0.9466)*	(4.0234)	(2.0051)	(0.7649)**	(6.5663)	(2.8289)
Issuer country	(3.0576)	(3.8180)	(1.9013)	(3.1700)	(5.6854)	(1.9867)	(2.8765)	(7.0149)	(1.7090)
Issuer sector-country	(2.9849)	(3.4106)	(1.9092)	(3.3102)	(5.3848)	(2.2181)	(2.6940)*	(6.2151)	(1.9523)
Total assets (EUR bn.)				0.0006	-0.0073	-0.0024	0.0015	-0.0037	-0.0029
Robust				(0.0013)	(0.0040)*	(0.0011)**	(0.0021)	(0.0061)	(0.0015)*
Issuer sector				(0.0009)	(0.0050)	(0.0015)	(0.0009)	(0.0043)	(0.0022)
Issuer country				(0.0015)	(0.0058)	(0.0018)	(0.0019)	(0.0129)	(0.0026)
Issuer sector-country				(0.0017)	(0.0058)	(0.0020)	(0.0024)	(0.0119)	(0.0025)
Leverage				0.5792	0.0835	0.2397	0.2746	-0.0913	0.0942
Robust				(0.2416)**	(0.0951)	(0.0815)***	(0.1560)*	(0.1505)	(0.0683)
Issuer sector				(0.0587)**	(0.0891)	(0.0360)***	(0.0876)*	(0.0720)	(0.0367)*
Issuer country				(0.3587)	(0.1458)	(0.1721)	(0.1782)	(0.2157)	(0.0992)
Issuer sector-country				(0.3348)*	(0.1405)	(0.1623)	(0.1818)	(0.1942)	(0.1081)
Return on equity				1.0339	0.2509	0.5230	1.7981	1.6252	0.8531
Robust				(1.2143)	(0.3718)	(0.3888)	(1.4880)	(1.0945)	(0.6307)
Issuer sector				(0.2729)*	(0.3043)	(0.3267)	(0.3874)**	(0.7700)	(0.2452)**
Issuer country				(1.5575)	(0.2920)	(0.4287)	(1.9234)	(1.5942)	(0.6868)
Issuer sector-country				(1.4716)	(0.3033)	(0.4616)	(1.5795)	(1.4755)	(0.6661)
Amount outstanding issuer				-0.1050	-0.0864	-0.0690	-0.0795	-0.2401	-0.0309
Robust				(0.0604)*	(0.0333)**	(0.0196)***	(0.0474)*	(0.1387)*	(0.0168)*
Issuer sector				(0.0471)	(0.1088)	(0.0111)***	(0.0556)	(0.3354)	(0.0224)
Issuer country				(0.0750)	(0.0438)*	(0.0420)	(0.0513)	(0.1039)**	(0.0225)

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Table 3.17: Supplement to Table 3.6: control variable estimates for the sample of all issuer countries (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Issuer sector-country				(0.0704)	(0.0519)	(0.0413)	(0.0524)	(0.1947)	(0.0208)
Green bond share of the issuer				0.0540	0.0128	0.0461	-0.0423	-0.1141	-0.0223
Robust				(0.0502)	(0.0259)	(0.0202)**	(0.0351)	(0.0563)**	(0.0203)
Issuer sector				(0.0873)	(0.0109)	(0.0192)*	(0.0153)	(0.0798)	(0.0306)
Issuer country				(0.0617)	(0.0290)	(0.0378)	(0.0356)	(0.0842)	(0.0176)
Issuer sector-country				(0.0584)	(0.0232)	(0.0304)	(0.0352)	(0.0744)	(0.0214)
NFC				8.0189	-1.7227	0.7058	-1.3291	-1.2935	-3.9277
Robust				(6.6174)	(4.5847)	(2.5720)	(6.6660)	(5.7153)	(3.1456)
Issuer sector				(5.7588)	(6.4626)	(4.1786)	(5.3902)	(7.4068)	(4.9122)
Issuer country				(4.4920)*	(5.8451)	(3.5005)	(7.0062)	(6.2863)	(4.2227)
Issuer sector-country				(7.8098)	(6.5795)	(5.6276)	(8.3958)	(7.8706)	(5.4452)
OTHER				-4.8998	-5.2213	-6.4093	-11.9014	-22.3473	-13.1101
Robust				(2.7044)*	(2.2283)**	(1.9611)***	(4.3979)***	(8.6394)**	(3.4715)***
Issuer sector				(1.9344)	(3.7762)	(2.1622)*	(6.0604)	(14.1528)	(5.6804)
Issuer country				(3.0729)	(3.1187)	(2.9328)**	(6.9253)	(11.7264)*	(5.6956)**
Issuer sector-country				(3.7483)	(3.1339)	(3.2533)*	(5.9391)*	(12.3594)*	(5.4040)**
Climate change contributor				20.5919	0.8944	5.1138	7.8355	-0.1584	2.8102
Robust				(8.3527)**	(3.4187)	(2.7363)*	(7.9801)	(5.0632)	(2.4752)
Issuer sector				(5.7686)*	(0.1713)**	(1.8289)*	(6.7860)	(2.5004)	(3.0593)
Issuer country				(7.0431)**	(3.6571)	(4.7735)	(7.8399)	(6.2251)	(4.3511)
Issuer sector-country				(8.2621)**	(4.1640)	(5.5623)	(9.0090)	(6.9658)	(4.7841)
Amount outstanding issuer country							-0.0078	-0.0067	-0.0070
Robust							(0.0022)***	(0.0024)***	(0.0012)***
Issuer sector							(0.0038)	(0.0025)*	(0.0019)**
Issuer country							(0.0030)**	(0.0033)*	(0.0020)***

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Table 3.17: Supplement to Table 3.6: control variable estimates for the sample of all issuer countries (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Issuer sector-country							(0.0029)**	(0.0033)*	(0.0018)***
Green bond share by issuer country							-4.7919	2.2240	-2.5822
Robust							(1.3246)***	(2.7739)	(1.0134)**
Issuer sector							(0.3612)***	(2.8982)	(1.2752)
Issuer country							(1.6035)**	(4.1531)	(1.5560)
Issuer sector-country							(1.5526)***	(3.7912)	(1.4652)*
Resolving insolvency score							-0.2763	-0.4621	-0.5247
Robust							(0.3188)	(0.2535)*	(0.2045)**
Issuer sector							(0.1795)	(0.4618)	(0.3169)
Issuer country							(0.3043)	(0.4061)	(0.3670)
Issuer sector-country							(0.3471)	(0.3910)	(0.3361)
Constant	6.3407	1.9661	5.2613	-17.6932	3.6077	-1.2097	53.1713	62.7031	72.5171
Robust	(1.2934)***	(0.3695)***	(0.6176)***	(9.2926)*	(3.4035)	(3.2226)	(34.3201)	(25.2109)**	(20.4631)***
Issuer sector	(2.0090)*	(0.8400)	(1.7378)**	(3.8299)**	(3.5923)	(1.7244)	(31.3158)	(48.2352)	(33.2288)
Issuer country	(3.6264)	(0.8627)**	(2.6308)*	(8.4026)*	(4.0778)	(5.7962)	(33.8084)	(38.8119)	(36.3079)*
Issuer sector-country	(3.4314)*	(0.7637)**	(2.2277)**	(9.7692)*	(4.3287)	(6.7409)	(37.8643)	(39.2426)	(33.5722)**
Observations	251	258	859	222	207	727	150	89	428
R-squared	0.0062	0.0490	0.0000	0.2710	0.1493	0.1401	0.5356	0.4985	0.4040
Adjusted R-squared	0.00221	0.0453	-0.00113	0.240	0.110	0.129	0.495	0.419	0.387

Notes: This table presents the estimated coefficients of the control variables used in the cross-sectional regression models reported in Table 3.6 for the sample spanning all green bond issuing euro area countries. For models (1) through (9), it reports the coefficient estimates and their corresponding standard errors (in parentheses) under different clustering specifications. The ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 3.18: Supplement to Table 3.6: control variable estimates for the sample of top 3 issuer countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Climate Disclosure	-1.2074	-0.1547	-0.1093	-0.9832	0.2652	-0.0665	-1.1920	1.1779	-0.1930
Robust	(0.3003)***	(0.3012)	(0.1747)	(0.3809)**	(0.2845)	(0.2100)	(0.3507)***	(0.5293)**	(0.2403)
Issuer sector	(0.1250)**	(0.1435)	(0.3582)	(0.1957)**	(0.0721)**	(0.2817)	(0.1696)**	(0.3877)*	(0.2498)
Issuer country	(0.3130)*	(0.1802)	(0.2027)	(0.4528)	(0.2347)	(0.1225)	(0.1039)***	(0.2895)*	(0.3692)
Issuer sector-country	(0.2060)***	(0.3337)	(0.2476)	(0.3706)**	(0.3133)	(0.2046)	(0.1376)***	(0.5504)*	(0.2490)
Total assets				0.0002	-0.0013	-0.0003	0.0014	-0.0034	-0.0001
Robust				(0.0003)	(0.0012)	(0.0002)	(0.0004)***	(0.0022)	(0.0003)
Issuer sector				(0.0001)*	(0.0009)	(0.0002)	(0.0000)***	(0.0021)	(0.0004)
Issuer country				(0.0003)	(0.0022)	(0.0005)	(0.0005)*	(0.0024)	(0.0006)
Issuer sector-country				(0.0002)	(0.0016)	(0.0005)	(0.0004)**	(0.0018)	(0.0006)
Leverage				0.0493	0.0080	0.0170	0.0694	0.0420	0.0320
Robust				(0.0278)*	(0.0160)	(0.0114)	(0.0278)**	(0.0349)	(0.0135)**
Issuer sector				(0.0020)***	(0.0090)	(0.0095)	(0.0212)*	(0.0104)**	(0.0127)*
Issuer country				(0.0173)	(0.0092)	(0.0169)	(0.0454)	(0.0297)	(0.0147)
Issuer sector-country				(0.0281)	(0.0093)	(0.0127)	(0.0325)*	(0.0336)	(0.0123)**
Return on equity				-0.3626	0.0565	-0.0169	-0.0946	-0.3214	-0.0910
Robust				(0.1714)**	(0.1055)	(0.0562)	(0.2192)	(0.2308)	(0.0705)
Issuer sector				(0.0968)*	(0.0858)	(0.0192)	(0.1668)	(0.5287)	(0.1003)
Issuer country				(0.0861)*	(0.0722)	(0.0392)	(0.3185)	(0.3848)	(0.0777)
Issuer sector-country				(0.0690)***	(0.0898)	(0.0293)	(0.2272)	(0.3660)	(0.0720)
Amount outstanding issuer				-0.0484	-0.0556	-0.0266	-0.0718	-0.0842	-0.0359
Robust				(0.0047)***	(0.0147)***	(0.0032)***	(0.0092)***	(0.0321)**	(0.0059)***
Issuer sector				(0.0050)**	(0.0131)**	(0.0010)***	(0.0048)***	(0.0396)	(0.0010)***
Issuer country				(0.0066)**	(0.0208)	(0.0010)***	(0.0158)**	(0.0113)**	(0.0009)***

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Table 3.18: Supplement to Table 3.6: control variable estimates for the sample of top 3 issuer countries (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Issuer sector country				(0.0056)***	(0.0154)***	(0.0010)***	(0.0146)***	(0.0246)***	(0.0010)***
Green bond share of the issuer				-0.0173	-0.0132	-0.0134	-0.0191	0.0031	-0.0160
Robust				(0.0062)***	(0.0089)	(0.0036)***	(0.0082)**	(0.0207)	(0.0053)***
Issuer sector				(0.0143)	(0.0106)	(0.0056)*	(0.0116)	(0.0553)	(0.0110)
Issuer county				(0.0046)*	(0.0119)	(0.0029)**	(0.0049)*	(0.0226)	(0.0033)**
Issuer sector-country				(0.0076)*	(0.0117)	(0.0047)**	(0.0071)**	(0.0375)	(0.0080)*
NFC				-0.5847	-1.9588	-0.6242	-2.4616	-5.2264	-1.0928
Robust				(1.3012)	(0.9640)**	(0.5760)	(1.0286)**	(2.1610)**	(0.7751)
Issuer sector				(1.3826)	(0.4367)**	(0.1818)**	(0.5147)**	(3.2788)	(0.3932)*
Issuer country				(0.1906)*	(0.3897)**	(0.3373)	(0.6016)*	(2.2238)	(0.5242)
Issuer sector-country				(1.5151)	(0.8416)**	(0.5733)	(0.9825)**	(2.7719)*	(0.5131)*
OTHER				-1.8780	-1.9651	-1.4846	-1.4189	-1.8062	-1.2435
Robust				(0.7194)***	(0.6783)***	(0.3299)***	(0.7362)*	(0.7835)**	(0.4801)**
Issuer sector				(0.3744)**	(0.3854)**	(0.2315)***	(0.0899)***	(0.5304)**	(0.3767)**
Issuer country				(0.8750)	(0.3431)**	(0.4181)*	(0.4480)*	(0.3957)**	(0.7848)
Issuer sector country				(0.7554)**	(0.5600)***	(0.3917)***	(0.3507)***	(0.4968)***	(0.4407)**
Climate change contributor				0.9021	-0.5277	-0.0752	0.1570	-0.2126	-0.0719
Robust				(1.3593)	(0.6500)	(0.4863)	(1.2306)	(1.3280)	(0.6555)
Issuer sector				(1.2195)	(0.3508)	(0.2015)	(0.5705)	(0.3771)	(0.4971)
Issuer country				(0.6749)	(0.4678)	(0.7878)	(0.7126)	(0.6098)	(0.9461)
Issuer sector-country				(1.4407)	(0.7105)	(0.6947)	(0.7827)	(0.7983)	(0.8402)
Amount outstanding issuer country							-0.0007	-0.0002	-0.0003
Robust							(0.0004)*	(0.0007)	(0.0003)
Issuer sector							(0.0001)**	(0.0012)	(0.0003)
Issuer country							(0.0004)	(0.0007)	(0.0002)

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Table 3.18: Supplement to Table 3.6: control variable estimates for the sample of top 3 issuer countries (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Issuer sector-country							(0.0004)	(0.0010)	(0.0003)
Green bond share by issuer country							-1.5156	-1.3980	-1.0380
Robust							(0.4670)***	(0.7780)*	(0.2355)***
Issuer sector							(0.1027)***	(1.6995)	(0.2468)**
Issuer country							(0.9556)	(1.0474)	(0.2736)*
Issuer sector-country							(0.7965)	(1.2288)	(0.3128)***
Resolving insolvency score							0.0915	-0.0986	-0.0162
Robust							(0.0371)**	(0.0964)	(0.0247)
Issuer sector							(0.0022)***	(0.1470)	(0.0333)
Issuer country							(0.0290)*	(0.1230)	(0.0435)
Issuer sector-country							(0.0193)***	(0.1291)	(0.0485)
Constant	1.6152	0.8765	0.9725	2.1927	3.7980	2.3289	0.9534	17.4266	7.5837
Robust	(0.2420)***	(0.1402)***	(0.1028)***	(1.4584)	(0.8849)***	(0.5237)***	(4.4380)	(11.1655)	(3.1406)**
Issuer sector	(0.1497)***	(0.1998)**	(0.2786)**	(1.2256)	(0.3526)***	(0.2060)***	(0.2366)*	(20.0670)	(1.4713)**
Issuer country	(0.1720)**	(0.2415)*	(0.2483)*	(1.2242)	(0.6454)**	(0.8015)	(6.2407)	(14.9468)	(4.6410)
Issuer sector-country	(0.1552)***	(0.1964)***	(0.2471)***	(1.4940)	(0.7679)***	(0.7559)**	(4.7026)	(17.1939)	(5.3356)
Observations	192	195	634	180	155	543	120	62	327
R-squared	0.0462	0.0012	0.0005	0.2080	0.1801	0.1499	0.4457	0.4387	0.2503
Adjusted R-squared	0.0411	-0.00397	-0.00113	0.166	0.129	0.136	0.383	0.301	0.222

Notes: This table presents the estimated coefficients of the control variables used in the cross-sectional regression models reported in Table 3.6 for the sample spanning the top three green bond issuing countries in the euro area. For models (1) through (9), it reports the coefficient estimates and their corresponding standard errors (in parentheses) under different clustering specifications. The ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Panel regression results

Tables 3.19 through 3.24 provide the results for regression eq. 2.2, which indicates the relation between corporate climate-related disclosures and green bond-level home bias based on a TWFE estimation technique. The regression is based on an unbalanced dataset covering quarterly observations (bond × quarter) between Q1 2014 and Q1 2022. Column (1) shows results for the model without covariates. Column (2) shows results for the model including bond controls, i.e. the bond's yield to maturity. Column (3) shows results for the model including both bond and issuer company controls. These are the company's total assets (EUR bn.), leverage, return on assets, total amount of bonds outstanding (EUR bn.) and green bond share. Column (4) shows results for the model including bond, issuer company and issuer country controls. The latter pertain to the issuer country's total amount outstanding in bonds, the country's green bond share and the country's resolving insolvency score. Coefficients and errors for covariates are omitted for readability but can be viewed in the online annex. All models include time (quarterly) and bond-level fixed effects. The baseline model for all countries without inclusion of covariates (Column (1), top panel) is based on 237 companies (58 of which adopted the disclosure standard) who issued 797 green bonds (of which 206 by the 58 companies). The baseline model for the top three issuer countries (Column 1, middle panel) is based on 124 companies (of which 30 adopted the disclosure standard) and 591 bonds (of which 139 issued by the 30 companies). Standard errors are shown in parentheses. Table 3.19 is estimated using heteroscedasticity-robust standard errors and Tables 3.20 to 3.24 use clustered errors at the bond, quarter, issuer sector, issuer country and issuer sector-country, respectively. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively. The models are shown for the complete sample (top panel), the top three green bond issuing countries (middle panel) and other countries (bottom panel). For readability and ease of comparison, Tables 3.19 to 3.24 do not show the coefficients for covariates. Instead, these are reported in Tables 3.25 to 3.27, corresponding to the sample including all green bond issuing counties, the top three issuing countries and the other countries, respectively.

Table 3.19: Panel regression results on climate disclosure and green bond home bias (baseline)

This table provides the results for regression Eq. 3.3, and is estimated using heteroscedasticity robust standard errors.

Association between climate disclosure and green bond home bias				
	(1)	(2)	(3)	(4)
			All countries	
Climate Disclosure	-1.4724***	-1.4774***	-1.2034***	-0.8838**
	(0.4387)	(0.4388)	(0.4319)	(0.3971)
Observations	6,405	6,405	4,855	4,855
R-squared	0.9653	0.9653	0.9716	0.9735
Adj. R-squared		0.960	0.967	0.969
Within R-squared	0.00363	0.00437	0.0627	0.126
Adj. within R-squared		0.00402	0.0611	0.124
			Top 3 countries	
Climate Disclosure	-0.1139	-0.1137	0.1380	0.0946
	(0.2648)	(0.2649)	(0.2813)	(0.2734)
Observations	4,826	4,826	3,724	3,724
R-squared	0.8512	0.8512	0.8548	0.8570
Adj. R-squared		0.829	0.832	0.834
Within R-squared	0.000120	0.000208	0.0612	0.0756
Adj. within R-squared		-0.000268	0.0591	0.0730
			Other countries	
Climate Disclosure	-0.2007	-0.1999	-2.0439*	-2.7873***
	(1.1529)	(1.1657)	(1.0459)	(1.0453)
Observations	1,578	1,578	1,130	1,130
R-squared	0.9660	0.9660	0.9728	0.9749
Adj. R-squared		0.960	0.967	0.970
Within R-squared	3.00e-05	3.05e-05	0.0563	0.130
Adj. within R-squared		-0.00146	0.0492	0.122
Bond controls	No	Yes	Yes	Yes
Issuer controls	No	No	Yes	Yes
Issuer country controls	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Bond FE	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.20: Panel regression results on climate disclosure and green bond home bias (robustness, clustered errors at bond level)

This table provides the results for regression Eq. 3.3, and is estimated using clustered errors at the bond level.

Association between climate disclosure and green bond home bias				
	(1)	(2)	(3)	(4)
		All countries		
Climate Disclosure	-1.4724	-1.4774	-1.2034	-0.8838
	(1.1844)	(1.1833)	(1.0576)	(0.9303)
Observations	6,405	6,405	4,855	4,855
R-squared	0.9653	0.9653	0.9716	0.9735
Adj. R-squared		0.960	0.967	0.969
Within R-squared	0.00363	0.00437	0.0627	0.126
Adj. within R-squared		0.00402	0.0611	0.124
No. Clusters	797	797	634	634
		Top 3 countries		
Climate Disclosure	-0.1139	-0.1137	0.1380	0.0946
	(0.6435)	(0.6437)	(0.6907)	(0.6487)
Observations	4,826	4,826	3,724	3,724
R-squared	0.8512	0.8512	0.8548	0.8570
Adj. R-squared		0.829	0.832	0.834
Within R-squared	0.000120	0.000208	0.0612	0.0756
Adj. within R-squared		-0.000268	0.0591	0.0730
No. Clusters	591	591	478	478
		Other countries		
Climate Disclosure	-0.2007	-0.1999	-2.0439	-2.7873
	(2.7338)	(2.7319)	(2.2782)	(2.4521)
Observations	1,578	1,578	1,130	1,130
R-squared	0.9660	0.9660	0.9728	0.9749
Adj. R-squared		0.960	0.967	0.970
Within R-squared	3.00e-05	3.05e-05	0.0563	0.130
Adj. within R-squared		-0.00146	0.0492	0.122
No. Clusters	206	206	156	156
Bond controls	No	Yes	Yes	Yes
Issuer controls	No	No	Yes	Yes
Issuer country controls	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Bond FE	Yes	Yes	Yes	Yes

Clustered standard errors (bond level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.21: Panel regression results on climate disclosure and green bond home bias (robustness, clustered errors at quarter level)

This table provides the results for regression Eq. 3.3, and is estimated using clustered errors at the quarter level.

Association between climate disclosure and green bond home bias				
	(1)	(2)	(3)	(4)
			All countries	
Climate Disclosure	-1.4724***	-1.4774***	-1.2034**	-0.8838**
	(0.4703)	(0.4682)	(0.4919)	(0.4177)
Observations	6,405	6,405	4,855	4,855
R-squared	0.9653	0.9653	0.9716	0.9735
Adj. R-squared		0.960	0.967	0.969
Within R-squared	0.00363	0.00437	0.0627	0.126
Adj. within R-squared		0.00402	0.0611	0.124
No. Clusters	33	33	32	32
			Top 3 countries	
Climate Disclosure	-0.1139	-0.1137	0.1380	0.0946
	(0.2638)	(0.2640)	(0.2747)	(0.2630)
Observations	4,826	4,826	3,724	3,724
R-squared	0.8512	0.8512	0.8548	0.8570
Adj. R-squared			0.832	0.834
Within R-squared	0.000120	0.000208	0.0612	0.0756
Adj. within R-squared		-0.000268	0.0591	0.0730
No. Clusters	33	33	32	32
			Other countries	
Climate Disclosure	-0.2007	-0.1999	-2.0439**	-2.7873**
	(0.8591)	(0.8743)	(0.9696)	(1.0848)
Observations	1,578	1,578	1,130	1,130
R-squared	0.9660	0.9660	0.9728	0.9749
Adj. R-squared		0.960	0.967	0.970
Within R-squared	3.00e-05	3.05e-05	0.0563	0.130
Adj. within R-squared		-0.00146	0.0492	0.122
No. Clusters	31	31	29	29
Bond controls	No	Yes	Yes	Yes
Issuer controls	No	No	Yes	Yes
Issuer country controls	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Bond FE	Yes	Yes	Yes	Yes

Clustered standard errors (quarter level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.22: Panel regression results on climate disclosure and green bond home bias (robustness, clustered errors at sector level)

This table provides the results for regression Eq. 3.3, and is estimated using clustered errors at the issuer sector level.

Association between climate disclosure and green bond home bias				
	(1)	(2)	(3)	(4)
			All countries	
Climate Disclosure	-1.4724	-1.4774	-1.2034	-0.8838
	(1.0679)	(1.0748)	(0.8331)	(0.4562)
Observations	6,405	6,405	4,855	4,855
R-squared	0.9653	0.9653	0.9716	0.9735
Adj. R-squared		0.960	0.967	0.969
Within R-squared	0.00363	0.00437	0.0627	0.126
Adj. within R-squared		0.00402	0.0611	0.124
No. Clusters	5	5	4	4
			Top 3 countries	
Climate Disclosure	-0.1139	-0.1137	0.1380	0.0946
	(0.2939)	(0.2926)	(0.1350)	(0.2063)
Observations	4,826	4,826	3,724	3,724
R-squared	0.8512	0.8512	0.8548	0.8570
Adj. R-squared		0.829	0.832	0.834
Within R-squared	0.000120	0.000208	0.0612	0.0756
Adj. within R-squared		-0.000268	0.0591	0.0730
No. Clusters	4	4	4	4
			Other countries	
FSB TCFD Supporter	-0.2007	-0.1999	-2.0439*	-2.7873*
	(0.7515)	(0.7603)	(0.7785)	(1.1747)
Observations	1,578	1,578	1,130	1,130
R-squared	0.9660	0.9660	0.9728	0.9749
Adj. R-squared		0.960	0.967	0.970
Within R-squared	3.00e-05	3.05e-05	0.0563	0.130
Adj. within R-squared		-0.00146	0.0492	0.122
No. Clusters	5	5	4	4
Bond controls	No	Yes	Yes	Yes
Issuer controls	No	No	Yes	Yes
Issuer country controls	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Bond FE	Yes	Yes	Yes	Yes

Clustered standard errors (issuer sector level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.23: Panel regression results on climate disclosure and green bond home bias (robustness, clustered errors at country level)

This table provides the results for regression Eq. 3.3, and is estimated using clustered errors at the issuer country level.

Association between climate disclosure and green bond home bias				
	(1)	(2)	(3)	(4)
		All countries		
Climate Disclosure	-1.4724	-1.4774	-1.2034	-0.8838
	(1.3111)	(1.3110)	(1.0434)	(0.9289)
Observations	6,405	6,405	4,855	4,855
R-squared	0.9653	0.9653	0.9716	0.9735
Adj. R-squared		0.960	0.967	0.969
Within R-squared	0.00363	0.00437	0.0627	0.126
Adj. within R-squared		0.00402	0.0611	0.124
No. Clusters	17	17	17	17
		Top 3 countries		
Climate Disclosure	-0.1139	-0.1137	0.1380	0.0946
	(0.2065)	(0.2078)	(0.3814)	(0.3270)
Observations	4,826	4,826	3,724	3,724
R-squared	0.8512	0.8512	0.8548	0.8570
Adj. R-squared		0.829	0.832	0.834
Within R-squared	0.000120	0.000208	0.0612	0.0756
Adj. within R-squared		-0.000268	0.0591	0.0730
No. Clusters	3	3	3	3
		Other countries		
Climate Disclosure	-0.2007	-0.1999	-2.0439	-2.7873
	(2.9264)	(2.9384)	(2.5754)	(3.1527)
Observations	1,578	1,578	1,130	1,130
R-squared	0.9660	0.9660	0.9728	0.9749
Adj. R-squared		0.960	0.967	0.970
Within R-squared	3.00e-05	3.05e-05	0.0563	0.130
Adj. within R-squared		-0.00146	0.0492	0.122
No. Clusters	14	14	14	14
Bond controls	No	Yes	Yes	Yes
Issuer controls	No	No	Yes	Yes
Issuer country controls	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Bond FE	Yes	Yes	Yes	Yes

Clustered standard errors (issuer country level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.24: Panel regression results on climate disclosure and green bond home bias (robustness, clustered errors at sector-country level)

This table provides the results for regression Eq. 3.3, and is estimated using clustered errors at the issuer sector-country level.

Association between climate disclosure and green bond home bias				
	(1)	(2)	(3)	(4)
		All countries		
Climate Disclosure	-1.4724	-1.4774	-1.2034	-0.8838
	(1.2437)	(1.2440)	(0.9682)	(0.8145)
Observations	6,405	6,405	4,855	4,855
R-squared	0.9653	0.9653	0.9716	0.9735
Adj. R-squared		0.960	0.967	0.969
Within R-squared	0.00363	0.00437	0.0627	0.126
Adj. within R-squared		0.00402	0.0611	0.124
No. Clusters	40	40	36	36
		Top 3 countries		
Climate Disclosure	-0.1139	-0.1137	0.1380	0.0946
	(0.2185)	(0.2187)	(0.2984)	(0.3205)
Observations	4,826	4,826	3,724	3,724
R-squared	0.8512	0.8512	0.8548	0.8570
Adj. R-squared		0.829	0.832	0.834
Within R-squared	0.000120	0.000208	0.0612	0.0756
Adj. within R-squared		-0.000268	0.0591	0.0730
No. Cluster variables	1	1	1	1
No. Clusters	11	11	11	11
		Other countries		
Climate Disclosure	-0.2007	-0.1999	-2.0439	-2.7873
	(2.7043)	(2.7046)	(2.2275)	(2.5618)
Observations	1,578	1,578	1,130	1,130
R-squared	0.9660	0.9660	0.9728	0.9749
Adj. R-squared		0.960	0.967	0.970
Within R-squared	3.00e-05	3.05e-05	0.0563	0.130
Adj. within R-squared		-0.00146	0.0492	0.122
No. Clusters	29	29	25	25
Bond controls	No	Yes	Yes	Yes
Issuer controls	No	No	Yes	Yes
Issuer country controls	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Bond FE	Yes	Yes	Yes	Yes

Clustered standard errors (issuer sector-country level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.25: Supplement to Table 3.7: control variable estimates for the sample of all countries

	(1)	(2)	(3)	(4)
Climate Disclosure	-1.4724	-1.4774	-1.2034	-0.8838
Robust	(0.4387)***	(0.4388)***	(0.4319)***	(0.3971)**
Bond	(1.1844)	(1.1833)	(1.0576)	(0.9303)
Quarter	(0.4703)***	(0.4682)***	(0.4919)**	(0.4177)**
Issuer sector	(1.0679)	(1.0748)	(0.8331)	(0.4562)
Issuer country	(1.3111)	(1.3110)	(1.0434)	(0.9289)
Issuer sector-country	(1.2437)	(1.2440)	(0.9682)	(0.8145)
Yield to maturity		0.0946	0.1584	0.1262
Robust		(0.0549)*	(0.0724)**	(0.0616)**
Bond		(0.0722)	(0.0923)*	(0.0794)
Quarter		(0.0480)*	(0.0693)**	(0.0576)**
Issuer sector		(0.0285)**	(0.0295)**	(0.0291)**
Issuer country		(0.0787)	(0.1017)	(0.0730)
Issuer sector-country		(0.0810)	(0.1058)	(0.0756)
Total assets (EUR bn.)			0.0035	0.0017
Robust			(0.0007)***	(0.0006)***
Bond			(0.0019)*	(0.0016)
Quarter			(0.0007)***	(0.0008)**
Issuer sector			(0.0027)	(0.0016)
Issuer country			(0.0034)	(0.0030)
Issuer sector-country			(0.0030)	(0.0024)
Leverage			0.0947	0.0728
Robust			(0.0207)***	(0.0167)***
Bond			(0.0374)**	(0.0289)**
Quarter			(0.0189)***	(0.0152)***
Issuer sector			(0.0197)**	(0.0156)**
Issuer country			(0.0538)*	(0.0416)*
Issuer sector-country			(0.0577)	(0.0452)
Return on assets			-0.0442	0.0036
Robust			(0.0188)**	(0.0175)
Bond			(0.0383)	(0.0338)
Quarter			(0.0155)***	(0.0146)
Issuer sector			(0.0185)*	(0.0029)
Issuer country			(0.0429)	(0.0459)
Issuer sector-country			(0.0437)	(0.0475)
Total amount outstanding			0.1429	0.1373
By issuer (EUR bn.)				
Robust			(0.0131)***	(0.0134)***
Bond			(0.0341)***	(0.0334)***
Quarter			(0.0138)***	(0.0159)***
Issuer sector			(0.0380)**	(0.0239)**
Issuer country			(0.0457)***	(0.0343)***

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	(1)	(2)	(3)	(4)
Issuer sector-country			(0.0427)***	(0.0371)***
Green bond share			-0.0619	-0.0504
By issuer				
Robust			(0.0139)***	(0.0128)***
Bond			(0.0359)*	(0.0318)
Quarter			(0.0127)***	(0.0123)***
Issuer sector			(0.0123)**	(0.0049)***
Issuer country			(0.0486)	(0.0445)
Issuer sector-country			(0.0492)	(0.0435)
Total amount outstanding				0.0069
By issuer country (EUR bn.)				
Robust				(0.0008)***
Bond				(0.0020)***
Quarter				(0.0010)***
Issuer sector				(0.0023)*
Issuer country				(0.0022)***
Issuer sector-country				(0.0026)**
Green bond share				1.8862
By issuer country				
Robust				(0.3155)***
Bond				(0.9317)**
Quarter				(0.2554)***
Issuer sector				(1.1281)
Issuer country				(1.2342)
Issuer sector-country				(1.2767)
Constant	6.5863	6.4823	3.3048	-16.5628
Robust	(0.1113)***	(0.1153)***	(0.8048)***	(2.5117)***
Bond	(0.2800)***	(0.2863)***	(2.0556)	(6.5504)**
Quarter	(0.1112)***	(0.1230)***	(0.6566)***	(2.5719)***
Issuer sector	(0.2524)***	(0.2850)***	(1.0972)*	(7.0971)
Issuer country	(0.3099)***	(0.2812)***	(2.7219)	(7.9660)*
Issuer sector-country	(0.2940)***	(0.2866)***	(2.7794)	(8.5221)*
Observations	6,405	6,405	4,855	4,855
R-squared	0.9653	0.9653	0.9716	0.9735
Adjusted R-squared	0.960	0.960	0.967	0.969

Notes: This table presents the estimated coefficients of the control variables used in the two-way fixed effects regression models reported in Table 3.7 for the sample spanning all green bond issuing euro area countries. For models (1) to (4), it reports the coefficient estimates and their corresponding standard errors (in parentheses) under different clustering specifications. The ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 3.26: Supplement to Table 3.7: control variable estimates for the sample of top three issuer countries

	(1)	(2)	(3)	(4)
Climate Disclosure	-0.1139	-0.1137	0.1380	0.0946
Robust	(0.2648)	(0.2649)	(0.2813)	(0.2734)
Bond	(0.6435)	(0.6437)	(0.6907)	(0.6487)
Quarter	(0.2638)	(0.2640)	(0.2747)	(0.2630)
Issuer sector	(0.2939)	(0.2926)	(0.1350)	(0.2063)
Issuer country	(0.2065)	(0.2078)	(0.3814)	(0.3270)
Issuer sector-country	(0.2185)	(0.2187)	(0.2984)	(0.3205)
Yield to maturity		-0.0141	0.0009	0.0000
Robust		(0.0095)	(0.0125)	(0.0122)
Bond		(0.0144)	(0.0199)	(0.0201)
Quarter		(0.0118)	(0.0180)	(0.0175)
Issuer sector		(0.0025)**	(0.0030)	(0.0088)
Issuer country		(0.0091)	(0.0159)	(0.0169)
Issuer sector country		(0.0087)	(0.0182)	(0.0196)
Total assets (EUR bn.)			-0.0011	-0.0016
Robust			(0.0004)***	(0.0004)***
Bond			(0.0009)	(0.0009)*
Quarter			(0.0005)**	(0.0006)***
Issuer sector			(0.0009)	(0.0005)**
Issuer country			(0.0004)	(0.0005)*
Issuer sector country			(0.0006)	(0.0006)**
Leverage			0.0111	0.0174
Robust			(0.0098)	(0.0101)*
Bond			(0.0245)	(0.0258)
Quarter			(0.0109)	(0.0105)
Issuer sector			(0.0271)	(0.0298)
Issuer country			(0.0122)	(0.0169)
Issuer sector-country			(0.0241)	(0.0265)
Return on assets			0.0755	0.0931
Robust			(0.0225)***	(0.0229)***
Bond			(0.0484)	(0.0476)*
Quarter			(0.0161)***	(0.0230)***
Issuer sector			(0.0439)	(0.0238)**
Issuer country			(0.0305)	(0.0255)*
Issuer sector country			(0.0319)**	(0.0223)***
Total amount outstanding			0.0910	0.0875
By issuer (EUR bn.)				
Robust			(0.0103)***	(0.0107)***
Bond			(0.0244)***	(0.0244)***
Quarter			(0.0120)***	(0.0130)***
Issuer sector			(0.0125)***	(0.0099)***

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	(1)	(2)	(3)	(4)
Issuer country			(0.0168)**	(0.0128)**
Issuer sector-country			(0.0215)***	(0.0230)***
Green bond share			0.0170	0.0178
By issuer				
Robust			(0.0071)**	(0.0071)**
Bond			(0.0169)	(0.0167)
Quarter			(0.0072)**	(0.0076)**
Issuer sector			(0.0101)	(0.0109)
Issuer country			(0.0208)	(0.0206)
Issuer sector-country			(0.0231)	(0.0215)
Total amount outstanding				0.0020
By issuer country (EUR bn.)				
Robust				(0.0007)***
Bond				(0.0013)
Quarter				(0.0012)
Issuer sector				(0.0027)
Issuer country				(0.0006)*
Issuer sector-country				(0.0018)
Green bond share by issuer country				-0.3197
Robust				(0.2147)
Bond				(0.4815)
Quarter				(0.2756)
Issuer sector				(0.3578)
Issuer country				(0.1984)
Issuer sector-country				(0.5073)
Constant	1.3220	1.3359	-1.4379	-6.1562
Robust	(0.0596)***	(0.0598)***	(0.4086)***	(2.1476)***
Bond	(0.1420)***	(0.1412)***	(0.9650)	(3.9901)
Quarter	(0.0582)***	(0.0604)***	(0.3894)***	(3.8667)
Issuer sector	(0.0648)***	(0.0631)***	(0.7320)	(7.7730)
Issuer country	(0.0456)***	(0.0532)***	(0.7716)	(1.8418)*
Issuer sector-country	(0.0482)***	(0.0492)***	(0.9610)	(4.8954)
Observations	4,826	4,826	3,724	3,724
R-squared	0.8512	0.8512	0.8548	0.8570
Adjusted R-squared	0.829	0.829	0.832	0.834

Notes: This table presents the estimated coefficients of the control variables used in the two-way fixed effects regression models reported in Table 3.7 for the sample spanning the other green bond issuing euro area countries. For models (1) to (4), it reports the coefficient estimates and their corresponding standard errors (in parentheses) under different clustering specifications. The ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 3.27: Supplement to Table 3.7: control variable estimates for the sample of other countries

	(1)	(2)	(3)	(4)
Climate Disclosure	-0.2007	-0.1999	-2.0439	-2.7873
Robust	(1.1529)	(1.1657)	(1.0459)*	(1.0453)***
Bond	(2.7338)	(2.7319)	(2.2782)	(2.4521)
Quarter	(0.8591)	(0.8743)	(0.9696)**	(1.0848)**
Issuer sector	(0.7515)	(0.7603)	(0.7785)*	(1.1747)*
Issuer country	(2.9264)	(2.9384)	(2.5754)	(3.1527)
Issuer sector-country	(2.7043)	(2.7046)	(2.2275)	(2.5618)
Yield to maturity		-0.0035	0.2373	0.1033
Robust		(0.1971)	(0.1784)	(0.1703)
Bond		(0.2654)	(0.2464)	(0.2209)
Quarter		(0.1800)	(0.1679)	(0.1514)
Issuer sector		(0.0892)	(0.0701)**	(0.0469)
Issuer country		(0.2573)	(0.2101)	(0.2109)
Issuer sector-country		(0.2592)	(0.2298)	(0.2238)
Total assets (EUR bn.)			0.0293	0.0415
Robust			(0.0067)***	(0.0069)***
Bond			(0.0068)***	(0.0081)***
Quarter			(0.0060)***	(0.0070)***
Issuer sector			(0.0091)**	(0.0067)***
Issuer country			(0.0039)***	(0.0029)***
Issuer sector country			(0.0073)***	(0.0046)***
Leverage			0.1399	0.1227
Robust			(0.0587)**	(0.0610)**
Bond			(0.0833)*	(0.0780)
Quarter			(0.0347)***	(0.0362)***
Issuer sector			(0.0141)***	(0.0048)***
Issuer country			(0.1031)	(0.0761)
Issuer sector-country			(0.1039)	(0.0759)
Return on assets			-0.0511	-0.0391
Robust			(0.0460)	(0.0468)
Bond			(0.0867)	(0.0791)
Quarter			(0.0322)	(0.0356)
Issuer sector			(0.0153)**	(0.0122)**
Issuer country			(0.0875)	(0.0684)
Issuer sector-country			(0.0920)	(0.0712)
Total amount outstanding			0.2568	0.1537
By issuer (EUR bn.)				
Robust			(0.2333)	(0.2292)
Bond			(0.2507)	(0.2363)
Quarter			(0.2366)	(0.2354)
Issuer sector			(0.2111)	(0.2072)

Continued on next page

Table 3.27 – continued from previous page

	(1)	(2)	(3)	(4)
Issuer country			(0.3071)	(0.3132)
Issuer sector-country			(0.3029)	(0.2812)
Green bond share			-0.0812	-0.0833
By issuer				
Robust			(0.0225)***	(0.0223)***
Bond			(0.0513)	(0.0466)*
Quarter			(0.0172)***	(0.0171)***
Issuer sector			(0.0234)**	(0.0097)***
Issuer country			(0.0566)	(0.0504)
Issuer sector-country			(0.0572)	(0.0491)
Total amount outstanding				-0.0321
By issuer country (EUR bn.)				
Robust				(0.0037)***
Bond				(0.0079)***
Quarter				(0.0042)***
Issuer sector				(0.0031)***
Issuer country				(0.0065)***
Issuer sector-country				(0.0063)***
Green bond share by issuer country				-1.3555
Robust				(0.5003)***
Bond				(1.0447)
Quarter				(0.5231)**
Issuer sector				(0.7720)
Issuer country				(1.1355)
Issuer sector-country				(1.0849)
Constant	21.4174	21.4224	19.2996	61.1279
Robust	(0.3536)***	(0.3646)***	(2.4213)***	(5.0942)***
Bond	(0.7779)***	(0.8844)***	(5.0449)***	(10.3052)***
Quarter	(0.2445)***	(0.2817)***	(1.8601)***	(5.2854)***
Issuer sector	(0.2138)***	(0.1977)***	(2.8894)***	(4.1866)***
Issuer country	(0.8327)***	(0.8451)***	(6.8402)**	(12.3728)***
Issuer sector-country	(0.7695)***	(0.8602)***	(6.3169)***	(11.0868)***
Observations	1,578	1,578	1,130	1,130
R-squared	0.9660	0.9660	0.9728	0.9749
Adjusted R-squared	0.960	0.960	0.967	0.970

Notes: This table presents the estimated coefficients of the control variables used in the two-way fixed effects regression models reported in Table 3.7 for the sample spanning the top three green bond issuing euro area countries. For models (1) to (4), it reports the coefficient estimates and their corresponding standard errors (in parentheses) under different clustering specifications. The ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Event study results

Table 3.28: Event study results (baseline, NN3 matched sample)

This table provides the results for the event study model defined in Eq. 3.5, showing the effect of a company adopting the climate-related disclosure standard on green bond-level home bias for six lead and lag periods. The treatment period itself, i.e. the moment of adoption, (T0) is omitted to avoid collinearity. The estimation is based on the matched set of companies as per the model presented in Column (4) of Table 3.9. Results are shown for the nearest neighbour (3) matching procedure. Robust standard errors are shown in parentheses. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)
τ_{-6}	0.0346	0.0746	0.2376	-0.2402
	(0.8836)	(0.8799)	(0.8154)	(0.7767)
τ_{-5}	-0.4718	-0.4546	-0.4507	-0.7683
	(0.8073)	(0.8043)	(0.8159)	(0.7664)
τ_{-4}	0.0151	0.0245	-0.2977	-0.7742
	(0.7327)	(0.7286)	(0.6976)	(0.6533)
τ_{-3}	-0.3900	-0.3912	-0.6187	-1.1583*
	(0.7325)	(0.7261)	(0.7426)	(0.7014)
τ_{-2}	0.4323	0.3485	0.0940	-0.1616
	(0.9983)	(1.0078)	(1.1758)	(1.1336)
τ_{-1}	-1.1023	-1.1145	-1.4222*	-1.8125**
	(0.9104)	(0.9041)	(0.8333)	(0.7576)
τ_{+1}	-1.5736*	-1.4839*	-2.0055**	-2.0063***
	(0.8377)	(0.8396)	(0.8257)	(0.7778)
τ_{+2}	-3.2544***	-3.1898***	-2.4349**	-2.4552***
	(1.0683)	(1.0627)	(0.9717)	(0.9412)
τ_{+3}	-2.6874***	-2.6336***	-1.0089	-1.1040*
	(0.7856)	(0.7801)	(0.6192)	(0.5967)
τ_{+4}	-1.1960	-1.3645	-0.3158	-0.2700
	(0.9743)	(0.9817)	(0.7719)	(0.7578)
τ_{+5}	-1.3874*	-1.3572*	-0.4638	-0.5778
	(0.7148)	(0.7193)	(0.5767)	(0.5700)
τ_{+5}	-1.0979*	-1.0891*	-0.0095	-0.0431
	(0.6595)	(0.6571)	(0.5037)	(0.5123)
Observations	3,913	3,913	3,196	3,196
R-squared	0.9212	0.9215	0.9426	0.9449
Adj. R-squared	0.909	0.909	0.932	0.935
Within R-squared	0.0115	0.0155	0.159	0.194
Adj. within R-squared		0.0118	0.154	0.188
Bond controls	No	Yes	Yes	Yes
Issuer controls	No	No	Yes	Yes
Issuer country controls	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Bond FE	Yes	Yes	Yes	Yes
Robust errors	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.29: Event study results (robustness, NN3 matched sample, clustered errors at sector-country level)

This table provides the results for the event study model defined in Eq. 3.5, showing the effect of a company adopting the climate-related disclosure standard on green bond-level home bias for six lead and lag periods. The treatment period itself, i.e. the moment of adoption, (T0) is omitted to avoid collinearity. The estimation is based on the matched set of companies as per the model presented in Column (4) of Table 3.9. Results are shown for the nearest neighbour (3) matching procedure. Robust standard errors, clustered at the issuer sector-country level, are shown in parentheses. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)
τ_{-6}	0.0346	0.0746	0.2376	-0.2402
	(0.6246)	(0.6166)	(0.8381)	(0.7572)
τ_{-5}	-0.4718	-0.4546	-0.4507	-0.7683
	(0.9275)	(0.9290)	(1.0999)	(0.9932)
τ_{-4}	0.0151	0.0245	-0.2977	-0.7742
	(0.8023)	(0.7931)	(1.0986)	(0.9471)
τ_{-3}	-0.3900	-0.3912	-0.6187	-1.1583
	(0.9883)	(0.9779)	(1.3112)	(1.1514)
τ_{-2}	0.4323	0.3485	0.0940	-0.1616
	(1.3262)	(1.3332)	(1.6600)	(1.4804)
τ_{-1}	-1.1023	-1.1145	-1.4222	-1.8125
	(1.3502)	(1.3353)	(1.3886)	(1.2690)
τ_{+1}	-1.5736	-1.4839	-2.0055	-2.0063
	(1.4883)	(1.4800)	(1.5750)	(1.4330)
τ_{+2}	-3.2544	-3.1898	-2.4349	-2.4552
	(2.1602)	(2.1540)	(1.6347)	(1.5196)
τ_{+3}	-2.6874	-2.6336	-1.0089	-1.1040
	(1.6069)	(1.6045)	(0.8647)	(0.7954)
τ_{+4}	-1.1960	-1.3645	-0.3158	-0.2700
	(0.8920)	(0.8630)	(0.7347)	(0.7210)
τ_{+5}	-1.3874	-1.3572	-0.4638	-0.5778
	(0.9516)	(0.9336)	(0.7095)	(0.6854)
τ_{+6}	-1.0979	-1.0891	-0.0095	-0.0431
	(0.7764)	(0.7798)	(0.7321)	(0.7667)
Observations	3,913	3,913	3,196	3,196
R-squared	0.9212	0.9215	0.9426	0.9449
Adj. R-squared	0.909	0.909	0.932	0.935
Within R-squared	0.0115	0.0155	0.159	0.194
Adj. within R-squared	0.00795	0.0118	0.154	0.188
Bond controls	No	Yes	Yes	Yes
Issuer controls	No	No	Yes	Yes
Issuer country controls	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Bond FE	Yes	Yes	Yes	Yes
Nr. Clusters	27	27	26	26

Clustered standard errors (issuer sector-country level) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.30: Event study results (robustness, NN3 matched sample, clustered errors at bond level)

This table provides the results for the event study model defined in Eq. 3.5, showing the effect of a company adopting the climate-related disclosure standard on green bond-level home bias for six lead and lag periods. The treatment period itself, i.e. the moment of adoption, (T0) is omitted to avoid collinearity. The estimation is based on the matched set of companies as per the model presented in Column (4) of Table 3.9. Results are shown for the nearest neighbour (3) matching procedure. Robust standard errors, clustered at the bond level, are shown in parentheses. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)
τ_{-6}	0.0346	0.0746	0.2376	-0.2402
	(1.0057)	(1.0009)	(1.0436)	(1.0091)
τ_{-5}	-0.4718	-0.4546	-0.4507	-0.7683
	(1.0611)	(1.0578)	(1.1097)	(1.0378)
τ_{-4}	0.0151	0.0245	-0.2977	-0.7742
	(0.9840)	(0.9786)	(1.0392)	(0.9705)
τ_{-3}	-0.3900	-0.3912	-0.6187	-1.1583
	(1.0455)	(1.0364)	(1.1099)	(1.0478)
τ_{-2}	0.4323	0.3485	0.0940	-0.1616
	(1.2039)	(1.2081)	(1.4099)	(1.3272)
τ_{-1}	-1.1023	-1.1145	-1.4222	-1.8125*
	(1.1408)	(1.1309)	(1.0747)	(0.9496)
τ_{+1}	-1.5736	-1.4839	-2.0055*	-2.0063**
	(1.1731)	(1.1660)	(1.1188)	(1.0072)
τ_{+2}	-3.2544**	-3.1898**	-2.4349**	-2.4552**
	(1.4246)	(1.4033)	(1.1371)	(1.0416)
τ_{+3}	-2.6874**	-2.6336**	-1.0089	-1.1040*
	(1.1555)	(1.1361)	(0.6941)	(0.6195)
τ_{+4}	-1.1960	-1.3645	-0.3158	-0.2700
	(1.2328)	(1.2475)	(0.8206)	(0.7730)
τ_{+5}	-1.3874	-1.3572	-0.4638	-0.5778
	(0.9604)	(0.9615)	(0.5986)	(0.5827)
τ_{+6}	-1.0979	-1.0891	-0.0095	-0.0431
	(0.8306)	(0.8311)	(0.5215)	(0.5426)
Observations	3,913	3,913	3,196	3,196
R-squared	0.9212	0.9215	0.9426	0.9449
Adj. R-squared	0.909	0.909	0.932	0.935
Within R-squared	0.0115	0.0155	0.159	0.194
Adj. within R-squared	0.00795	0.0118	0.154	0.188
Bond controls	No	Yes	Yes	Yes
Issuer controls	No	No	Yes	Yes
Issuer country controls	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Bond FE	Yes	Yes	Yes	Yes
Nr. Clusters	489	489	434	434

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.31: Event study results (robustness, NN1 matched sample, robust standard errors)

This table provides the results for the event study model defined in Eq. 3.5, showing the effect of a company adopting the climate-related disclosure standard on green bond-level home bias for six lead and lag periods. The treatment period itself, i.e. the moment of adoption, (T0) is omitted to avoid collinearity. The estimation is based on the matched set of companies as per the model presented in Column (4) of Table 3.9. Results are shown for the nearest neighbour (1) matching procedure. Robust standard errors are shown in parentheses. The ***, ** and * stand for significant coefficients at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)
τ_{-6}	0.6240	0.6468	0.8920	0.2198
	(1.1498)	(1.1527)	(1.0081)	(0.8820)
τ_{-5}	0.0538	0.0660	0.1110	-0.2773
	(1.0307)	(1.0322)	(1.0749)	(0.9323)
τ_{-4}	0.1044	0.1104	-0.1560	-0.7038
	(0.8728)	(0.8700)	(0.8856)	(0.8063)
τ_{-3}	-0.4110	-0.4105	-1.1737	-1.5362
	(0.9687)	(0.9655)	(1.1189)	(1.0732)
τ_{-2}	0.4341	0.4012	-0.2789	-0.4371
	(1.0706)	(1.0702)	(1.4484)	(1.3933)
τ_{-1}	0.4798	0.4814	-0.4240	-0.5246
	(1.1221)	(1.1177)	(1.3655)	(1.2432)
τ_{+1}	-0.3326	-0.2446	-0.3471	-0.3751
	(0.8639)	(0.8696)	(1.0390)	(0.9843)
τ_{+2}	-2.1416*	-2.0851*	-1.2749	-1.4213
	(1.1298)	(1.1335)	(1.0358)	(1.0214)
τ_{+3}	-1.2467	-1.2113	0.0627	-0.1939
	(0.8800)	(0.8830)	(0.6489)	(0.5900)
τ_{+4}	0.2208	0.0670	0.8587	0.7880
	(1.3753)	(1.3876)	(1.0105)	(0.9961)
τ_{+5}	-0.6539	-0.6269	-0.2909	-0.4299
	(0.8914)	(0.8979)	(0.6025)	(0.5912)
τ_{+6}	-0.1752	-0.1639	0.3060	0.3463
	(0.8134)	(0.8104)	(0.5900)	(0.5947)
Observations	2,604	2,604	2,157	2,157
R-squared	0.9596	0.9597	0.9689	0.9701
Adj. R-squared	0.952	0.952	0.963	0.964
Within R-squared	0.00436	0.00635	0.174	0.206
Adj. within R-squared	-0.00107	0.000478	0.166	0.197
Bond controls	No	Yes	Yes	Yes
Issuer controls	No	No	Yes	Yes
Issuer country controls	No	No	No	Yes
Time FE	Yes	Yes	Yes	Yes
Bond FE	Yes	Yes	Yes	Yes
Robust errors	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Part II

Emerging evidence on the impact of EU sustainable finance legislation on the allocation and cost of capital for green investments in the EU

Chapter 4

Do ESG disclosures affect the allocation and cost of capital for green investments in the EU: a rapid review

Abstract The EU has introduced an extensive ESG disclosure regime aimed at redirecting private capital to support the transition to a sustainable economy. However, it remains unclear whether these disclosure obligations lead to measurable shifts in the allocation and cost of capital for green investments. This study addresses this gap by synthesising empirical findings on how voluntary and mandatory ESG disclosures relate to capital market outcomes in the EU, identifying research gaps and limitations and suggesting avenues for future research and implications for policy. Using a rapid review approach, it structures the evidence within a population–intervention–outcome framework and complements this with an analysis of underlying mechanisms. The review draws on publications from three academic databases (Scopus, Web of Science, EconLit) and grey literature from EU authorities, resulting in 99 eligible studies published between 2010 and 2025. Overall, the evidence base is still relatively limited and fragmented. Although findings are not unequivocal, they broadly indicate that higher-quality ESG disclosures and stronger ESG performance tend to be associated with better access to finance and more favourable financing conditions. However, many studies focus on market efficiency and firm performance, which may influence capital allocation and funding costs only indirectly. In addition, only a limited number of contributions explicitly analyse the effects of EU sustainable finance legislation, underscoring the need for further work in this domain. The review suggests that regulators should carefully monitor potential unintended consequences of mandatory ESG disclosure and ensure that investor information needs are met while ensuring proportionality, clarity and predictability in regulatory design.

4.1 Introduction

Since 2018, the European Union (EU) has established a comprehensive sustainable finance framework that revolves around improving transparency through environmental, social and governance (ESG) disclosure legislation, with the objective of mobilising private capital and improving funding conditions for sustainable projects (European Commission, 2018; European Commission, 2021b). Achieving the EU's climate-neutrality objective by 2050 will require large-scale reallocation of private capital towards sustainable investment projects. Given the limited capacity of public budgets, the success of the green transition critically depends on the ability of financial markets to mobilise and allocate private funds effectively.

Despite these ambitions, it remains unclear whether and under which conditions mandatory ESG disclosures can channel capital towards green investments and lower their cost of capital. ESG disclosures are at the heart of the EU sustainable finance framework, yet the extent to which disclosure-based regulation can influence capital market outcomes in line with policy objectives remains an open empirical question.

First, although research on ESG disclosure has expanded rapidly in recent years, much of the established accounting and finance literature on disclosure focuses on financial reporting, and its conclusions may not be directly applicable to ESG-related reporting (H. Christensen, Hail and Leuz, 2021). In contrast to financial disclosures, which are directly relevant to investors, ESG disclosures can cover a broad range of issues that may or may not influence investment decisions. ESG reporting can reflect 'single materiality', which concerns how ESG factors influence firm performance, or 'double materiality', which also focuses on how firms' actions influence environmental and social outcomes.[1] While single materiality disclosures are more directly linked to firm value and therefore more comparable to standard financial reporting, both types of ESG disclosure may be only partially reflected in investors' decisions due to a 'tragedy of the commons', in which the costs and benefits of ESG issues extend beyond investors' time horizons and are instead borne by other stakeholders (Hardin, 1968; Carney, 2015; Schoenmaker and Schramade, 2018). Consequently, it is not a priori evident that the channels through which financial disclosures influence capital allocation and pricing will apply to ESG disclosures with the same direction and magnitude.

Second, most of the empirical research to date concerns voluntary ESG disclosures,

[1] The 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. H. Christensen, Hail and Leuz (2021) specifically contrast the double materiality reporting principle with 'single materiality' reporting, which only deals with how firms are financially affected by environmental and social issues.

mirroring prevailing market practice (H. Christensen, Hail and Leuz, 2021; Krueger et al., 2024). In a voluntary context, firms themselves choose whether or not to disclose. Since firms with stronger ESG performance are more likely to disclose and provide higher-quality information, this complicates drawing inferences about the effects of disclosures on observed market outcomes (H. Christensen, Hail and Leuz, 2021). Moreover, mandatory disclosure regimes may create incentives for strategic disclosures by weaker ESG performers, including generic 'boilerplate' language and 'greenwashing' (H. Christensen, Hail and Leuz, 2021; Gorovaia and Makrominas, 2025), potentially limiting the usefulness of reported information for investors. As a result, findings from voluntary disclosures may not readily generalise to mandatory disclosure regimes.

Third, the majority of the literature on ESG disclosures is based on the United States (US) (McGee et al. (2025), Rani et al. (2025) and Martinez-Meyers, Ferrero-Ferrero and Muñoz-Torres (2024)), typically in a voluntary setting. Differences in institutional design, legal frameworks, financial market structures and cultural characteristics may moderate the relation between ESG disclosures and capital market outcomes, which limits the extent to which findings from the US carry over to the EU context. Given that the EU is a frontrunner in adopting a comprehensive and legally binding multilateral ESG disclosure framework (Krueger et al., 2024), the EU landscape offers a particularly informative empirical setting to study the impact of mandatory ESG disclosures on capital market outcomes.

These considerations motivate the need for an EU-focused synthesis of the emerging evidence on how ESG disclosures relate to capital market outcomes. Against this background, I adopt a rapid review methodology and synthesise the emerging evidence on the impact of mandatory ESG disclosure under the EU sustainable finance framework on capital markets. Specifically, this review addresses three research questions:

RQ1 What evidence exists on the impact of voluntary and mandatory ESG disclosures on the mobilisation of private capital and cost of capital for green investments within the EU?

RQ2 What are the main gaps and limitations in the existing empirical literature?

RQ3 What implications can be drawn from the current state of evidence for future research avenues and the ongoing policy debate?

By answering these research questions, this study provides a novel perspective on the extant ESG disclosure literature. Adopting a rapid review methodology, I structure the literature along the lines of the markets and market participants studied (population), the type of ESG disclosure examined (intervention), the mechanisms through which these interventions are hypothesised to operate and the capital market outcomes considered. In doing so, the review

documents whether the existing evidence supports the intended capital market channels of EU sustainable finance legislation and identifies research gaps and limitations that can inform future research. The synthesis may also provide relevant input for policymakers and regulators during the ongoing calibration of the EU sustainable finance regulation such as the recent Sustainable Finance Omnibus packages.[2]

This study closely relates to H. Christensen, Hail and Leuz (2021), who conduct an economic analysis and narrative literature review on mandatory ESG reporting and discuss implications in the US context. To my knowledge, the present study is the first to focus on mandatory ESG disclosures in the EU context, and on allocation and cost of capital specifically.

This review is based on literature identified using three academic databases (Scopus, Web of Science, and EconLit) and is supplemented with grey literature from the European Central Bank and the European Supervisory Authorities. The search strategy was organised around the relevant population, intervention and outcomes. The identification and screening stages yielded 99 included publications, 17 of which are grey literature, published between 2010 and 2025. These were complemented by a targeted search for literature on underlying mechanisms.

The synthesis suggests that the current evidence base remains limited and fragmented. However, while results are not unequivocal, the literature reviewed in this study broadly suggests that high-quality ESG disclosures and performance are associated with improved access to capital and more favourable funding conditions. At the same time, much of the evidence concerns market efficiency and firm performance outcomes, which may only indirectly affect allocation and cost of capital. Moreover, the subset of studies that directly study the impact of EU sustainable finance legislation is currently still limited, underscoring the need for further research in this area.

The rest of the paper is organised as follows. Section 2 explains the research methodology adopted for the rapid review. Section 3 synthesises the literature. Section 4 discusses implications for future research directions and the ongoing policy debate, and Section 5 concludes.

4.2 Methodology

To address the research questions formulated in Section 4.1, I employ a structured and systematic rapid review approach. Specifically, my approach is inspired by the ‘guidance

[2]Directive (EU) 2026/470, Directive (EU) 2025/794.

on methods used in Cochrane rapid reviews of effectiveness' (Garritty et al., 2024). In light of the EU's rapidly evolving sustainable finance framework, marked by the recent mid-course adjustments via the Omnibus packages, a rapid review method is particularly appropriate to inform the current and future regulatory and policy debate. The review process comprised four main steps, which are described in Sections 4.2.1 through 4.2.5. The overall search strategy and search query for this study were reviewed by an information specialist in accordance with the PRESS framework (McGowan et al., 2016).[3]

4.2.1 Pilot search

First, I carried out a pilot study to develop and refine the search query. The pilot search served to gain an initial overview of the body of literature relevant to the subject of this study. The findings of this preliminary exploration were subsequently used to refine and develop the final search query. Inspired by the PICO framework commonly used in the field of medicine (Deeks et al., 2023), I structured my search around the 'population', 'intervention' and 'outcomes' of interest. Table 4.1 summarises the search framework; Annex 1 contains the search query used for the Scopus database (this query was adapted for the remaining databases; the corresponding queries for these databases are available upon request).

Table 4.1: 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.

[3] I thank Norma Fötsch, information specialist at Radboud University Nijmegen, for critically reviewing the search strategy and search query and providing valuable feedback.

4.2.2 Identification of relevant literature

Second, I searched both academic databases and grey literature sources to identify relevant records. This section describes the procedure used to identify the relevant academic and grey literature. Figure 4.3 in Appendix A provides an overview of the record identification and selection process following the PRISMA protocol (PRISMA Statement, 2020; Moher et al., 2015; Page, McKenzie and Bossuyt, 2021).

Academic database search

To identify the relevant body of academic literature, I applied the search query to three databases: Scopus, Web of Science and EconLit. Scopus and Web of Science are widely used databases and provide broad, multidisciplinary coverage. EconLit is the most widely used authoritative source for economics and finance literature. In addition, I adopted the following inclusion criteria. First, I only considered articles published between 2010 and 2025. This temporal restriction is justified by two main considerations. The pilot search revealed that the majority of ESG-related studies were published within this period, whereas prior to 2010 ESG-related research constituted a relatively marginal strand of literature. Moreover, and more importantly, this time frame corresponds to the evolution of the European Union's sustainable finance framework, whose foundations were established in 2014 and which has been substantially advanced since the launch of the European Green Deal in 2018 (European Commission, 2018; European Commission, 2021b). Second, I only included publications in English. Third, I only considered peer reviewed articles or review articles.[4] Fourth, I confined the search to literature published in the field of economics and finance.[5]

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

[4]This entailed applying the following database-specific filters: Scopus - 'article' or 'review article' and 'final'; Web of Science - 'article' or 'review article'; EconLit - 'journal article' and 'peer reviewed'.

[5]Specifically, in Scopus I limited the search to the fields 'business' or 'economics'; in Web of Science, I limited the search to 'economics' or 'management' or 'business' or 'business finance' (Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI)); in EconLit, no subcategories were available.

Grey literature search

Grey literature was obtained from the European Central Bank (ECB) and the European Supervisory Authorities (ESAs), namely the European Banking Authority (EBA), the European Insurance and Occupational Pensions Authority (EIOPA) and the European Securities and Markets Authority (ESMA). Given their mandates, these institutions are highly likely to have produced analytical work relevant to the research questions. In addition, they have access to proprietary supervisory datasets, which can meaningfully complement studies conducted by academic researchers.

Within each of these websites, I searched their respective publication repositories using keyword filters corresponding to the research topic, including 'sustainable finance', 'climate' or 'green'. The grey literature search was performed on 5 January 2026, and all documents meeting the predefined inclusion criteria were retrieved on that date. Following deduplication, 174 unique records were identified. From these, I retained only analytical publications, resulting in a subset of 80 records. Non-analytical or predominantly opinion-based materials such as guidelines, opinions and recommendations were excluded from further consideration.

4.2.3 Screening

The third step involved a two-stage manual relevance screening. Given that the identification strategy resulted in a relatively limited set of records (828 journal articles and 80 grey literature records), I employed a manual screening procedure comprising sequential title-abstract screening followed by full-text screening. The aim of the screening process was to identify 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 exercise resulted in a set of 82 journal articles and 18 grey literature documents. Since one grey literature document corresponded to a journal article publication, I removed this record from the grey literature set. The resulting records were assessed for eligibility using a small set of tailored quality assessment criteria.[6] No further records were excluded.

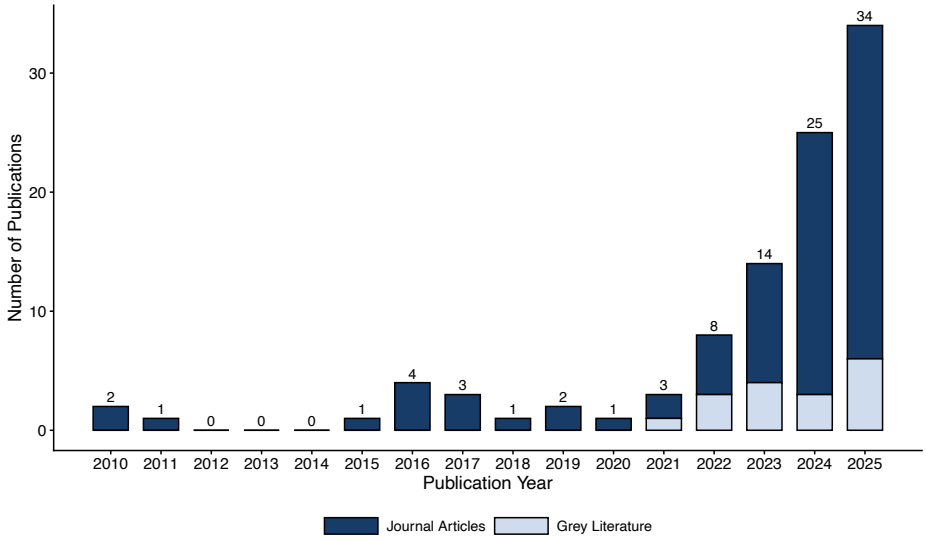
4.2.4 Inclusion

Based on this search strategy, a total of 99 documents were included, comprising 82 records retrieved from academic databases and 17 documents identified from the grey literature.

[6]Concretely, 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.

Table 4.2 provides an overview of the distribution of the included academic articles across journals. Figure 4.1 provides an overview of the distribution of publication years across both academic and grey literature.

Figure 4.1: Distribution of publication years of included academic and grey literature



4.2.5 Complementary search on mechanisms

Finally, as a fourth step, I conducted a complementary literature search into 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 leads to the observed outcome. It also helps assess whether multiple, potentially competing mechanisms are at play in the given context. Where such mechanisms coexist, the literature can indicate which dominate empirically. The empirical literature included in this review informed the subsequent complementary search. In particular, the search strategy was guided by the theories most frequently referenced in the empirical studies. In other words, the complementary search was structured around the theoretical frameworks that appear most prominently in the empirical literature.

Table 4.2: Distribution of included academic articles across journals

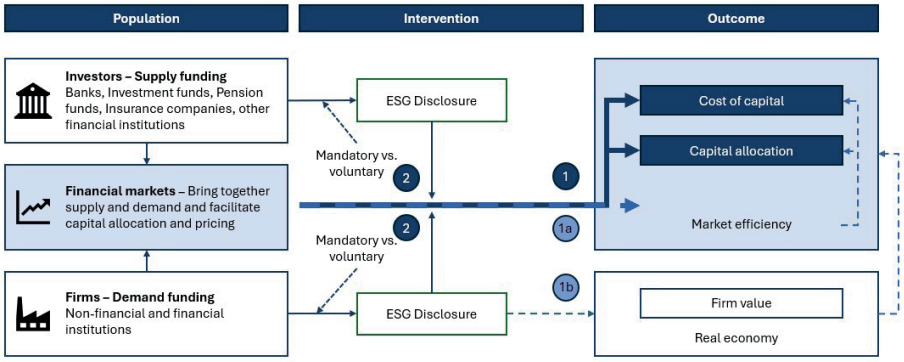
This table presents the distribution of the included academic articles across journals, along with their Scopus quartile rankings and ABDC scores. The Scopus quartile corresponds to the journal's ranking in the year the article was published, except for articles published in 2025, for which the 2024 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.

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

4.3 Synthesis of the literature

The synthesis of the literature follows the conceptual framework depicted in Figure 4.2. Section 4.3.1 characterises the coverage of the identified evidence across EU financial markets and market participants. Section 4.3.2 provides institutional background to the voluntary and mandatory ESG disclosure covered, summarises how the identified evidence base is distributed between voluntary and mandatory ESG disclosures and discusses identification challenges. Section 4.3.3 discusses the mechanisms linking ESG disclosures to capital market outcomes. Finally, Section 4.3.4 synthesises the evidence on the effects of ESG disclosures on the allocation of private capital towards green investments and the associated cost of capital.

Figure 4.2: Conceptual framework



Note: The *population* encompasses the actors operating in *EU* financial markets, specifically the financial institutions that supply capital, and the non-financial or financial institutions that seek capital for green projects or activities. The *intervention* is defined as ESG disclosures, which may be either voluntary or mandatory. ESG disclosures can be issued by firms seeking to raise funds for green projects (demand side) as well as by financial institutions that provide financing for these projects (supply side). The primary outcome variables comprise the allocation and cost of private capital towards green investment projects in both equity and debt markets. The circled numbers indicate the *mechanisms*: dark circles denote the main mechanisms of interest, while light circles denote indirect channels revealed by the literature.

4.3.1 Population

The empirical evidence base (N=99) predominantly covers studies with a European-wide scope (81),[7] although some studies focus on a smaller group of EU countries (5) or a single EU country (13). The majority of studies (65 out of 99) evaluate capital market outcomes (direct: capital allocation, cost of capital; indirect: market efficiency, firm performance) through the lens of financial and/or non-financial firms that issue ESG disclosures or for which ESG ratings are available. Of these studies, most cover listed firms (46) that are constituents of stock indices.[8] While these indices span firms across various sizes (large, mid, small cap), the evidence base may overall tilt towards larger and more liquid firms in the market. These studies can be considered as taking a 'demand side' perspective. Other studies focus on financial intermediaries in a 'supply side' role, focusing on loan provision and pricing by banks (14) or asset allocation by investment funds (13).[9] The evidence base is currently less developed for insurance companies and pension funds (one study each). These patterns in coverage should be considered when interpreting the evidence, particularly with regard to generalisability across EU markets and market participants. Thus, findings are not automatically transferable beyond the current scope and would require reassessment.

4.3.2 Intervention

This review evaluates voluntary and mandatory ESG disclosures. For voluntary disclosures, the search strategy employed a broad-based approach, to capture all potentially relevant studies across a wide range of global initiatives (see Table 4.13). Voluntary ESG disclosures can take multiple forms. Prominent examples of widely used 'double materiality' frameworks include the Global Reporting Initiative (GRI), the UN Global Compact (UNGC), disclosures indicating alignment with the UN Sustainable Development Goals (UN SDGs) and certain accreditations under International Organization for Standardization (ISO) standards.[10] 'Single materiality' frameworks comprise, for example, standards developed by the Sustainability Accounting Standards Board (SASB) and the Financial Stability Board's industry-led Task

[7] Here, 'European-wide' typically refers to multi-country European samples; a subset of studies includes non-EU markets such as Switzerland and Norway, alongside a set of EU countries.

[8] Such as STOXX Europe 600, MSCI All Cap (large-, mid-, and small-cap) [14 studies], EURO STOXX 50, STOXX Europe 200/500, DAX40, CAC40, SBF120, STOXX Nordic 30, S&P Europe 350 (large cap), AIM2 Italia (small cap).

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

[10] These standards can be accessed via Global Reporting Initiative (2026), United Nations Global Compact (2026), United Nations General Assembly (2015), United Nations Department of Economic and Social Affairs (2026) and International Organization for Standardization (2026).

Force on Climate-related Financial Disclosures (TCFD). Frameworks and standards directed at institutional investors and the financial sector include the Principles for Responsible Investment (PRI) and the UNEP Finance Initiative's Principles for Responsible Banking (PRB).[11]

Beyond firm-level standards, voluntary disclosures also span product-level certifications, including green bond standards such as ICMA's Green Bond Principles and those issued by the Climate Bonds Initiative.[12] Finally, a distinct form of ESG information consists of ratings or scores provided by third parties. While sometimes publicly available, systematic access to ESG ratings typically requires payment. As such, ESG ratings can be considered a costly private signal. ESG rating providers may follow an investor-pays (user) or issuer-pays (firm obtaining the rating) model, which can result in different incentive structures and, potentially, different perceptions of credibility.[13]

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 legislation 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

[11]These standards can be accessed via IFRS Foundation (2026), Financial Stability Board Task Force on Climate-related Financial Disclosures (2017), Principles for Responsible Investment (2026), United Nations Environment Programme Finance Initiative (2026a) and United Nations Environment Programme Finance Initiative (2026b).

[12]These standards can be accessed via International Capital Market Association (2025) and Climate Bonds Initiative (2025).

[13]ESMA reported that 59 ESG rating providers are active in the EU, with a few large non-EU actors and numerous smaller EU-headquartered firms. Most providers use an investor (user)-pays model, but issuer-pays models are also prevalent (European Securities and Markets Authority, 2022).

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.

Against this institutional background, an initial review of the identified literature gives rise to several overarching observations. First, a substantial share of empirical studies does not explicitly state whether the relation between ESG disclosures and capital market outcomes is examined in a voluntary or mandatory disclosure regime (N=64) and/or what the disclosure intervention is compared against in terms of institutional context, which complicates the interpretation of results. In practice, this requires readers to possess in-depth knowledge of the institutional context, including the relevant (national) disclosure regimes, to appropriately place empirical findings. Second, some studies narratively link the analysis of ESG disclosures to regulations in this domain to underscore policy relevance, yet they do not directly examine the effects of the regulations themselves. Third, another group of studies examines ESG disclosures in a mandatory reporting regime but focuses only on the post-adoption period, which hampers identification of the effect of the regulatory regime. Finally, among the studies that use a DiD (or FE) type identification design, there is quite some variation in what is considered the 'treatment date', sometimes referring to the legislations' proposal, adoption or entry into force date.

Tables 4.3 and 4.4 document the subset of identified studies that make explicit whether mandatory (N=20) or voluntary (N=15) ESG disclosures are being studied, and provide insight into the population and period studied, the type of ESG disclosure under consideration and the methodological identification strategy. An immediate observation is that the literature on mandatory ESG disclosures in the context of the EU sustainable finance framework is nascent and has, quite naturally, only emerged over the last few years. This is also reflected in the distribution of studies across regulations: the most researched legislation is the NFRD (N=6) and SFDR (N=9), which were adopted earlier than other key legal acts. The voluntary ESG disclosure literature mainly focuses on non-financial disclosure or integrated reporting and alignment with widely adopted standards such as GRI, the UN Global Compact or the UN SDGs (N=11), as well as on third-party assurance (N=4) and signalling adherence to global standards (N=4).

Across the full set of identified studies, the majority of the literature is based on ESG

ratings (N=56), followed by non-financial disclosures or integrated reporting (NFD/IR, N=26), ESG news (N=6), third-party assurance (N=5) and other (N=6) (intervention types are not mutually exclusive). Beyond coverage and design choices, the literature exhibits recurring identification challenges that complicate causal interpretation across both voluntary and mandatory disclosure settings. First, as mentioned above, the presence or absence of a mandatory disclosure regime may moderate the estimated effects of adherence to voluntary standards. If voluntary and mandatory disclosures act as substitutes, failing to account for prior regulatory exposure may attenuate estimated effects; if, by contrast, mandatory regimes enhance the credibility, comparability or enforcement of disclosures, estimated effects may be inflated. Second, a common identification challenge is that the effect of disclosure itself is difficult to disentangle from the effect of ESG performance. Studies using similar measures sometimes take the perspective of studying disclosure (see, e.g., Oehler and Horn (2025), Bachner (2025), Anselmi and Petrella (2025) and Horky, Pasquali and Magazzino (2024)), while others are framed as studying ESG performance (see, e.g., Campanella et al. (2025), Seefloth et al. (2025), S.-L. Chen, D.-N. Wang and H.-W. Chen (2025), Martinez-Meyers, Ferrero-Ferrero and Muñoz-Torres (2024), Ugolini, J. Reboredo and Ojea-Ferreiro (2024) and Priem and Gabellone (2024)). Especially in voluntary settings, disclosure and performance are related because better-performing firms may self-select in issuing ESG disclosure reports, acquiring assurance or engaging with third-party ESG rating providers. Even when third-party ESG rating providers adopt an investor-pays model and are therefore 'independent' from firms' ESG performance, rating methodologies often build, at least in part, on firms' self-disclosed information (see e.g. Anselmi and Petrella (2025) for an overview); in some cases, disclosure quantity and quality are integral components of the overall rating or score. Few studies disentangle these effects (Eliwa, Aboud and Saleh, 2021) or acknowledge that ESG ratings may capture both disclosure and performance (Anselmi and Petrella, 2025). These challenges should be considered when interpreting the outcomes presented in this body of literature.

Table 4.3: Mandatory sustainability disclosure interventions

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 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	Lower risk factor disclosure intensity and pre-TR period	NMF/PCA; FE
Tonnarello et al. (2025)	EU	NFC	2012–2022	TR KPI disclosure by firms, post-TR proposal (2018)	Firms that do not disclose TR KPIs; pre-TR period	DiD
Bassen et al. (2025)	EU (global)	F&NFC	2017–2020	High TR-alignment disclosures by firms, post-TR adoption (2020)	Low-alignment firms (matched); Pre-TR period	PSM–DiD
Ghitti et al. (2025)	Global	NFC	2013–2023	'Dark green' bonds, post-TR application (2021)	'Light green' bonds; pre-TR period	DiD
Sustainable Finance Disclosure Regulation (SFDR)						

Reference	Population		Obs period	Intervention	Comparator	Method
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
Popescu et al. (2023)	EU	IF	2019	Article 9 funds	Conventional funds	Stats
Becker, F. Martin and Walter (2022)	EU	IF	2019–2021	Post-SFDR adoption (2019) affecting EU funds	US-based funds; pre-SFDR period	DiD
Mazzolini et al. (2025)	EU	IF	2016–2021	Article 6/8/9 self-classification	Morningstar strategy categories	Stats
Schreiner and Beyer (2025)	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 4.4: Voluntary sustainability disclosure interventions

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)

Reference	Population		Obs. period	Intervention	Comparator	Method
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, Jasova 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
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.

4.3.3 Mechanisms

How can ESG disclosures redirect capital towards, and lower cost of capital for, green investments?

Broadly speaking, the literature identifies two main mechanisms through which ESG disclosures can channel capital towards green investments and lower their cost of capital. The first mechanism is based on the idea that ESG disclosures reveal information about a firm's risks and cash flows, which investors factor into their decisions. Neoclassical asset pricing theory and information economics help explain how this mechanism operates. First, although neoclassical asset pricing models (Sharpe, 1964; Lintner, 1965; Fama and French, 1993) do not explicitly model information, they imply a disclosure mechanism (Cai, 2023). If ESG disclosures help investors better assess how a firm's cash flows co-move with the overall market (its beta), then required returns fall (rise) and capital reallocates towards (away from) firms whose perceived market co-movement is revised downward (upward). In addition, if firms' ESG disclosures convey new and relevant information at the aggregate level, they may alter the market risk premium, thereby influencing financing costs economy-wide. By contrast, these neoclassical asset pricing theories imply that information that is purely idiosyncratic to a firm, or constitutes only 'noise', is not priced and thus does not affect either capital allocation or the cost of capital.

Information economics offers the micro-foundations underlying these neoclassical asset pricing theories and assumes more realistic market structure and behavioural characteristics. Studies that formally embed disclosures generally confirm the intuition implied in neoclassical theory (Lambert, Leuz and Verrecchia, 2007; Hughes, Liu and Liu, 2007; Lambert, Leuz and Verrecchia, 2012). For instance, when investors hold heterogeneous beliefs about the same information, 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). With information asymmetries between informed and uninformed investors, disclosures can have an impact beyond improving investors' average accuracy (as in Easley and O'hara (2004)). If informed institutional investors are not price takers but instead can move market prices by trading large volumes, information asymmetry reducing disclosures can improve market liquidity by mitigating adverse-selection risk for uninformed investors and thereby lead to better capital allocation and pricing (Hughes, Liu and Liu, 2007; Lambert, Leuz and Verrecchia, 2012). When information asymmetry occurs between firms and investors instead, firms' voluntary risk disclosures reduce their cost of capital (Jorgensen and Kirschenheiter, 2003; Cheynel, 2013). The core idea is that better performing firms issue credible 'signals' to attract investors (in line with the seminal theory

by Spence (1973)).

Two important caveats must be made regarding the mechanisms derived from neoclassical asset pricing theory and information economics. First, most of the neoclassical asset pricing literature considers financial disclosures. Since ESG disclosures are fundamentally different from financial disclosures, the same mechanisms may or may not apply, depending on whether investors consider ESG aspects in their decision making (H. Christensen, Hail and Leuz, 2021). ESG disclosures can span single materiality, meaning how ESG factors affect firm performance, and double materiality, indicating how a firm's activities affect environmental and social outcomes. While the link with firm performance and relevance for investors seems more direct for single materiality reporting, both single and double materiality disclosures may not fully feed into investors' decision due to a 'tragedy of the commons', when the costs and benefits of ESG factors fall outside investors' horizons and are borne by others (Hardin, 1968; Schoenmaker and Schramade, 2018). This is particularly the case in the 'environmental' domain, where the impact of climate change will be felt primarily by future generations (Carney, 2015). Consequently, it is not a priori evident that the mechanisms through which financial disclosures impact capital allocation and pricing carry over with the same strength to ESG disclosures. Some ESG disclosures (single materiality) can be financially relevant via cash-flow or risk channels, while other disclosures (double materiality) may or may not primarily inform societal welfare rather than firm value. The literature on ESG disclosures is growing and 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 (see e.g. H. Christensen, Hail and Leuz (2021), Pedersen, Fitzgibbons and Pomorski (2021), Dhaliwal et al. (2011), El Ghoul et al. (2011) and Goss and Roberts (2011)).

Second, the prediction from signalling theory that better performing or less risky firms are more likely to provide voluntary disclosures poses an empirical identification challenge related to self-selection. This self-selection bias implies that the effects of ESG disclosures are difficult to disentangle from ESG performance, and that the empirical findings on the association between voluntary ESG disclosures and capital market outcomes may not be generalisable to the effect across a broader range of firms under a mandatory ESG disclosure regime (Leuz and Wysocki, 2016; H. Christensen, Hail and Leuz, 2021). This is discussed in further detail in Section 4.3.3.

A second mechanism links ESG disclosures to the allocation and cost of capital for green investments via the broader institutional context in which firms operate. Stakeholder (Freeman, 1984), legitimacy (Suchman, 1995) and institutional (DiMaggio and Powell, 1983) theories are often used to explain why firms undertake ESG initiatives or provide ESG

disclosures. Although these and related theoretical perspectives each have their own specific nuances, they all converge on the idea that firms need to be attentive to the broader context in which they operate. To survive and prosper, firms must align with prevailing social norms, comply with regulations and satisfy stakeholder expectations. Failure to do so can place firms at a competitive disadvantage or even force them out of the market. For instance, firms that can credibly signal their commitment to performing well on ESG aspects can benefit from a larger customer base (Flammer, 2015), have better access to human capital (Turban and Greening, 1997) or suppliers (H. Christensen, Hail and Leuz, 2021), have more intangible resources such as goodwill (Barney, 1991) and have better access to funding at a lower cost (El Ghoul et al., 2011; Dhaliwal et al., 2011). In contrast, firms that fail to meet stakeholder expectations 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).

Indirect effect through market efficiency The extent to which ESG disclosures can channel capital towards green investments and reduce their cost of capital may in part depend on how efficiently markets incorporate this information, although the effect is indirect and not directly inferable. If ESG disclosures provide credible and easy-to-interpret signals that investors take into consideration for their capital allocation decisions, such disclosures may lower disagreement or uncertainty in the market and improve price discovery (R. Wang et al., 2024; Fuhrmann et al., 2017). By 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 can result in higher bid-ask spreads. If the market is not fully efficient in integrating information, persistently high bid-ask spreads may raise transaction costs in the long term. This, in turn, could affect required returns as investors demand to be compensated for higher costs (Gibson Brandon, Krueger and Schmidt, 2021). Moreover, uncertainty could reduce liquidity in financial markets as investors grow more hesitant and await further information before making a trade (Bachner, 2025; Amihud and Mendelson, 1986). Again, this may result in higher required returns and thus cost of capital if such uncertainty around ESG disclosures were to persist in the long term. Importantly, this mechanism only prevails if markets are persistently inefficient.

Indirect effect through firm value ESG disclosures may also indirectly affect capital allocation and cost of capital for green investments through their impact on firm value. According to shareholder theory (M. Friedman, R. D. Friedman and Gardner, 1962), the purpose of firms is to maximise shareholder value. Within this framework, ESG disclosures

may enhance firm value if disclosures have clear economic benefits. As discussed above, examples of such benefits could stem from broadening the customer or investor base or from avoiding regulatory fines or litigation costs.

However, ESG disclosures are costly and not devoid of risks. The preparation and dissemination of non-financial disclosure reports pose costs to the firm (Grewal, Riedl and Serafeim, 2019). With respect to risks, the literature points to potential proprietary costs (Verrecchia, 1983; Dye, 1985; Beyer, Cohen et al., 2010; Ott, Schiemann and Günther, 2017), i.e. the risk that disclosures reveal information about a firms' business model, which could undermine its competitiveness. Moreover, not meeting previously communicated targets may create backlash from stakeholders (H. Christensen, Hail and Leuz, 2021). Managers may also engage in costly self-serving behaviour under the guise of ESG activities and disclosures (M. Khan et al., 2024; Anwer et al., 2021).

Finally, the pressure put on firms by stakeholders (including regulators) to disclose ESG information may also incentivise the firm to enhance its ESG performance (H. Christensen, Hail and Leuz, 2021). This can improve firm value in the long run (Eccles, Ioannou and Serafeim, 2014), but may also be associated with costs, for instance because it requires investments in R&D (Doni and Fiameni, 2024), becoming more energy efficient, better waste-management, and so on (Grewal, Riedl and Serafeim, 2019). Whether ESG disclosures have a net positive or negative effect remains an empirical question and depends on the situation. Firm size (Bruna et al., 2022), industry and industry norms (García et al., 2020) or power and expectations of stakeholders have been coined as moderating factors. Either way, if ESG disclosures have a real impact on firm value, this could ultimately lead markets to reassess firms' future cash-flows, risks and their co-movement in the market. If changes in firm value indeed cause investors to update their beliefs, this would then affect required returns and capital allocation.

Voluntary versus mandatory ESG disclosures

The mechanisms through which mandatory ESG disclosure affects capital market outcomes may differ from those operating under voluntary ESG disclosure. H. Christensen, Hail and Leuz (2021) provide a comprehensive synthesis and discussion of the literature and suggest that, in voluntary settings, firms self-select regarding disclosure, so that better ESG-performing firms may be more likely to disclose. As a result, empirical associations between ESG disclosure and capital market outcomes can partly reflect underlying performance rather than disclosure itself. This complicates the disentanglement of disclosure effects from performance differences (H. Christensen, Hail and Leuz, 2021; Leuz and Wysocki, 2016). In

a mandatory disclosure regime, by contrast, firms with weaker ESG performance are also required to disclose, which may attenuate the positive associations observed under voluntary disclosure regimes.

In addition, H. Christensen, Hail and Leuz (2021) suggest that the mandatory nature of ESG disclosure may moderate the disclosure-capital market relation through several channels. First, insofar as mandatory frameworks improve the reliability and comparability of ESG information and reduce complexity and interpretation costs, they may strengthen the informational environment and thereby improve the efficiency of capital pricing and allocation relative to voluntary regimes. However, if mandatory disclosure induces strategic reporting among firms that would not disclose voluntarily, for example through 'boilerplate' (see also H. B. Christensen, Hail and Leuz (2018)) reporting or 'greenwashing', the information environment may become less transparent, undermining potential capital-market benefits. Furthermore, in addition to altering disclosure incentives, mandatory ESG disclosure may incentivise firms to improve their underlying ESG performance. To the extent that such responses have real effects on firm performance and value, they may also affect firms' access to capital and funding costs. In sum, these considerations imply that the impact on capital market outcomes of a shift from voluntary to mandatory ESG disclosure is not straightforward and remains an empirical question.

4.3.4 Outcomes

This section synthesises the empirical evidence on the capital market outcomes associated with ESG disclosures, with a primary focus on their implications for the allocation and cost of private capital for green investments in the EU, addressing RQ1. Section 4.3.4 synthesises the literature along the 'allocation' and 'cost' of capital dimension and further organises the evidence across two dimensions: equity versus debt markets and primary versus secondary market outcomes. In addition to these direct results, Section 4.3.4 also reviews evidence on market efficiency and firm performance as two indirect channels through which ESG disclosures may influence capital allocation and cost of capital, while acknowledging that they were not explicitly targeted by the search strategy and can therefore not be considered comprehensive. Subsequently, Section 4.3.4 zooms in on outcomes associated with mandatory ESG disclosures under the EU sustainable finance framework. Finally, Section 4.3.4 provides a high-level overview of factors identified in the literature that help explain heterogeneity in outcomes.

Evidence on how ESG disclosures influence the allocation and cost of capital for green investments

This section addresses RQ1 by synthesising evidence on how ESG disclosures and ESG performance are associated with the allocation and cost of private capital for green investments in the EU. Overall, the literature provides emerging and still fragmented evidence that ESG disclosures and performance are relevant to investors' decision making.[14] The emerging evidence suggests that firms' ESG disclosure and performance is positively associated with access to capital and more favourable funding costs, although the evidence base is currently weaker for equity than for debt financing.

Equity markets

Cost of Equity 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, as documented in Table 4.5. A few studies suggest that ESG disclosures and performance are associated with lower market betas (M. Khan et al., 2024) and lower cost of equity or capital (R. Wang et al., 2024; Orens, Aerts and Cormier, 2010; Priem and Gabellone, 2024; M. Khan et al., 2024), while one study finds evidence that investors required compensation for greenwashing risk prior to the adoption of the Paris Agreement (Bachner, 2025). At the same time, contrasting evidence suggests that ESG scores are not associated with excess returns in equity markets, suggesting 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 high ESG performance are associated with lower cost of equity.

Allocation of equity The reviewed literature on equity allocation focuses predominantly on fund portfolio allocation and investors' portfolio decisions in the equity mutual fund

[14] A 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.

market, as described in Table 4.6. In particular, this branch of study emerged largely in the context of the SFDR. Generally speaking, these studies document that funds generally hold portfolios in line with their sustainability objectives. In particular, funds that classify themselves as 'dark green' (SFDR Article 9) tend to reduce portfolio carbon intensity and reorientate holdings towards greener assets through portfolio tiling and divestment (Abouarab, Mishra and Wolfe, 2025). These adjustments are accompanied by positive net fund inflows (Becker, F. Martin and Walter, 2022). This is indicative of investor demand for sustainable investment products. At the same time, the evidence points to substantial heterogeneity across fund categories and measurement approaches. Several studies find that funds that self-classify as having 'light green' objectives (SFDR Article 8) do not materially differ from conventional funds in terms of portfolio composition and that observed greenness crucially depends on how sustainability is defined and measured (Abouarab, Mishra and Wolfe, 2025; Sanctuary et al., 2025; Popescu et al., 2023). 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).

While the reviewed literature hints at a positive association between ESG disclosures and 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 for green equity investments. These findings may not be fully representative of actual funding conditions faced by firms that want to raise capital in the market.

Debt markets

Cost of Debt Compared to the literature on equity markets, the emerging evidence on the association between ESG disclosures and performance and cost of debt, as shown in Table 4.7, is more firmly based on primary markets, which is in part due to studies by supervisory authorities that observe proprietary data on bank lending. This subset of studies examines realised borrowing costs at issuance or origination, including corporate bond yields (Agnese and Giacomini, 2023; Ghitti et al., 2025) and bank lending rates (Beyer and Nobile, 2025; Altavilla et al., 2024), rather than relying on secondary market price inference. Some studies consider accounting measures such as interest expense over total debt as an indicator of cost of debt (Campanella et al., 2025; Hamrouni, Uyar and Boussaada, 2019; Eliwa, Aboud and Saleh, 2021). These studies tend to associate a greenium with the issuance of green bonds, meaning that green bond issuers pay lower rates in the bond market. In addition, firms that signal high ESG performance can obtain bank funding at more favourable rates.

Table 4.5: Association between ESG disclosures and cost of equity

This table summarises the literature on the relation between ESG disclosures and the cost of equity. Findings are grouped according to primary and secondary market outcomes. Furthermore, they are classified based on whether the study provides evidence consistent with the expected outcome (+), no or mixed evidence (0), or evidence that contradicts (-) the expected outcome (where the expected outcome is to be interpreted as the objective of ESG disclosure legislation). These classifications were made by the author and do not necessarily equal the sign of the estimated coefficients for the outcome variables reported in the cited studies. The references in italics represent grey literature.

Outcome	**References**	**Key insights**
	Cost of debt and equity	
(+) lower cost of capital	*Gormsen, Huber and Oh (2025)*; M. Khan et al. (2024)	Firms with better ESG scores perceive their cost of capital to be lower. There is evidence that these firms exhibit lower market betas and a lower weighted average cost of capital.
(0) no effect, mixed	Priem and Gabellone (2024)	High-performing ESG firms tend to have lower costs of capital, but this relation only seems significant in countries with weaker legal systems.
	Cost of equity – Primary market	
(+) lower cost of equity	Harasheh (2023)	SMEs that credibly signal high ESG performance prior to their IPO experience lower levels of underpricing and can therefore issue equity shares at higher prices.
	Cost of equity – Secondary market	
(+) lower cost of equity	Bacher et al. (2025); R. Wang et al. (2024); Orens, Aerts and Cormier (2010)	Credible sustainable finance regulations are associated with a reduction in firms' cost of capital. Before the Paris Agreement, greenwashing risk was reflected in equity premia, but this effect disappeared afterwards. Similarly, the introduction of mandatory sustainability disclosure regimes in the UK is linked to a lower cost of capital. Credible, high-quality voluntary ESG disclosures are likewise correlated with reduced implied equity costs.
(0) no effect, mixed	Anselmi and Petrella (2025)	After controlling for standard market and size risk factors, ESG scores do not have a statistically significant impact on excess returns, calculated as the difference between stocks' actual returns and those implied by the Fama-French five factors model. In other words, there is no sign of an emergence of an ESG risk factor.

Table 4.6: Association between ESG disclosures and allocation of equity

This table summarises the literature investigating the relation between ESG disclosures and the equity allocation. Findings are grouped according to primary and secondary market outcomes. Furthermore, they are classified based on whether the study provides evidence consistent with the expected outcome (+), no or mixed evidence (0), or evidence that contradicts (-) the expected outcome (where the expected outcome is to be interpreted as the objective of ESG disclosure legislation). These classifications were made by the author. The references in italics represent grey literature.

Outcome	**References**	**Key insights**
		Primary market
(+) reorientation towards sustainable investments	Giakoumelou et al. (2024)	FinTech firms that offer ESG disclosures can raise larger amounts of capital than those that do not provide these disclosures. Investors interpret ESG disclosures as a positive signal. Nonetheless, specific information on ESG performance, such as rankings certification, does not have any effect.
		Secondary market
(+) reorientation towards sustainable investments	Abouarab, Mishra and Wolfe (2025); Ramos, Cortez and Silva (2024); Martinez-Meyers, Ferrero-Ferrero and Muñoz-Torres (2024); Scheitza and Busch (2024); Papathanasiou and Koutsokostas (2024); Popescu et al. (2023); Becker, F. Martin and Walter (2022); *Piazza (2025)*; *Brouwer et al. (2025)*	The studies referenced on the left indicate that following the introduction of the SFDR, self-labelled sustainable funds reduced greenwashing and proactively lowered the carbon intensity of their portfolios, through portfolio tilts and divestments. This holds true for 'dark green' (Art. 9) funds. Funds describing themselves as sustainable likewise saw notable fund inflows. Additional research suggests that self-classification as sustainable is often consistent with third-party ratings or labels (from third-party rating providers or governmental and non-profit organisations). ESMA guidance on how to interpret the self-labelling criteria prompted funds with greater fossil fuel exposure to remove sustainability references from their names.
(-) no reorientation towards sustainable investments	Abouarab, Mishra and Wolfe (2025); Sanctuary et al. (2025); Popescu et al. (2023); *Mazzolini et al. (2025)*; *Mosson (2024)*	In contrast, the studies listed here do not find any significant reorientation of investment funds' capital towards green investments. Notably, funds that self-classified as 'light green' (Art.8) upon the introduction of the SFDR did not seem to shift their portfolios towards green investments, and in many ways are not any different from conventional funds.

This positive effect of signalling green performance is not unequivocal, however, as some studies find no evidence of a systematic green bond premium (Menz, 2010; Balitzky and Reiche, 2023) across both primary and secondary bond markets, or structural differences in lending rates (Giannetti, Jasova et al., 2023). Finally, some studies show that ESG factors are incorporated into credit ratings (S.-L. Chen, D.-N. Wang and H.-W. Chen, 2025) and CDS spreads (Ugolini, J. Reboredo and Ojea-Ferreiro, 2024), suggesting that these may become informational substitutes (Ghitti et al., 2025).

Allocation of debt In line with the evidence base on cost of debt, the identified literature on credit allocation, summarised in Table 4.8, focuses primarily on bank lending, thus offering more direct evidence on firms' access to external finance. This evidence mainly originates from research conducted by supervisory authorities (Altavilla et al., 2024; Gambacorta et al., 2023; Giannetti, Jasova 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 based on firms' balance sheet metrics such as short- and long-term debt or leverage (Minnetti et al., 2025; 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 (Minnetti et al., 2025; Birindelli, Quas et al., 2025; Gallucci, Santulli and Tipaldi, 2025; Priem and Gabellone, 2024; Pietrovito and Rancan, 2024). These patterns are particularly pronounced following climate policy milestones and recent supervisory attention to climate risk in banks (De Cicco, Gschossmann and Kok, 2025), and are more evident among banks with stronger own ESG performance or more substantive sustainability disclosures. However, the evidence also points to heterogeneous lending responses. These studies suggest that banks that lend more to brown firms or themselves engage in 'boilerplate' ESG reporting continue to lend and even increase lending to brown firms (De Cicco, Gschossmann and Kok, 2025; Giannetti, Jasova et al., 2023; Gambacorta et al., 2023; Mueller and Sfrappini, 2022).

Indirect channels: market efficiency and firm performance While not explicitly targeted for this review, the identified literature includes several studies that investigate the association between ESG disclosure and performance and outcomes related to market efficiency and firm performance. Outcomes related to market efficiency and firm performance may influence the allocation and cost of capital, but only indirectly and under additional assumptions. As such, this body of literature complements the evidence on direct capital market outcomes but does not in itself provide evidence to directly support the answer to RQ1. As mentioned before, given that these indirect channels were not targeted in this review, the identified literature on

Table 4.7: Association between ESG disclosures and cost of debt

This table summarises the literature on the relation between ESG disclosures and the cost of debt. The classification of studies follows the same principles as Table 4.5.

Outcome	References	Key insights
	Cost of debt – General	
(+) lower cost of debt	S.-L. Chen, D.-N. Wang and H.-W. Chen (2025); Ugolini, J. Reboredo and Ojea-Ferreiro (2024)	Credit rating agencies seem to incorporate environmental performance. Social and governance aspects (and controversies) are less consistently integrated in ratings, likely due to measurement complexity. Furthermore, climate transition risk is reflected in CDS spreads of banks with high climate risk exposure.
	Cost of debt – Primary market	
(+) lower cost of debt	Campanella et al. (2025); Agnese and Giacomini (2023); *Beyer and Nobile (2025)*; *Altavilla et al. (2024)*; Eliwa, Aboud and Saleh (2021); Hamrouni, Uyar and Boussaada (2019)	Firms with strong ESG performance incur lower borrowing costs. Banks charge lower interest rates to firms with lower emissions and higher rates to those involved in climate-related litigation. Banks themselves secure cheaper funding in bond markets when their own ESG scores are higher. Empirical evidence further suggests that bonds labelled green by external reviewers command a yield premium (greenium), although this effect vanishes once the same green bonds also carry a conventional credit rating.
(0) no effect	*Giannetti, Jasova et al. (2023)*	Banks follow diverse lending policies: some reduce, while others increase, credit to brown firms, with interest rates and other loan terms mostly unchanged.
	Cost of debt – Secondary market	
(+) lower cost of debt	P. Zhou et al. (2025); Ghitti et al. (2025); Kanamura (2025); *Pietsch and Salakhova (2022)*; *Balitzky and Reiche (2023)*	Green labels reduce required yields on bonds (greenium), particularly for externally reviewed bonds compared to self-labelled bonds.
(0) no effect, mixed	Menz (2010);*Balitzky and Reiche (2023)*	These studies do not find evidence of a systematic and consistent greenium in ESG bonds.

Table 4.8: Association between ESG disclosures and allocation of debt

This table summarises the literature on the relation between ESG disclosures and the allocation of credit. The classification of studies follows the same principles as Table 4.6.

Outcome	References	Key insights
		General
(+) reorientation towards sustainable investments	*Mazzacurati (2023)*	Energy firms, utilities and banks issuing green bonds are more likely to disclose emissions data and exhibit stronger reductions in carbon intensity relative to non-issuers, consistent with strengthened climate commitments.
		Primary market
(+) reorientation towards sustainable investments	Minnetti et al. (2025); Birindelli, Quas et al. (2025); Priem and Gabellone (2024); Gallucci, Santulli and Tipaldi (2025); Pietrovito and Rancan (2024); *De Cicco, Gschossmann and Kok (2025)*; *Gambacorta et al. (2023)*; *Reghezza et al. (2022)*; *Mueller and Sfrappini (2022)*; Danisman and Tarazi (2024); *Altavilla et al. (2024)*	Firms' ESG rating and disclosure is associated with access to bank credit. Specifically, high-ESG performing/disclosing firms seem to be less financially constrained than low-ESG performing/disclosing firms. After the Paris Agreement, banks started shifting lending towards sustainable firms. The same trend is visible following the 2022 ECB climate stress test. Banks that are high ESG performers and reflect general concern (a more negative tone) in their own ESG disclosures drive these findings. Banks scoring lower on ESG performance and adopting a more symbolic approach to ESG reporting (positive tone) reorientate their lending to a lesser extent (or even increase lending to brown firms). Moreover, banks' own ESG performance has been associated with access to market funding during the global financial crisis, where high-performing banks faced lower reductions in market funding.
(-) no reorientation towards sustainable investments	*Giannetti, Jasova et al. (2023)*; *Mueller and Sfrappini (2022)*	These studies document heterogeneous patterns in bank lending and indicate that institutions that place greater emphasis on environmental aspects in their disclosures, as well as those that are themselves more adversely exposed to climate risk, provide larger volumes of credit to brown borrowers, without imposing higher interest rates or shortening loan maturities. These findings cannot be explained by the financing of borrowers' sustainability transitions. The studies further indicate that banks with close relationships with brown borrowers tend to engage in strategic disclosure practices and are reluctant to sever ties with existing brown clients, particularly when these clients display weak financial performance.

indirect channels is not comprehensive.

Market efficiency The subset of studies that investigate market efficiency outcomes addresses whether information on firms' ESG performance is deemed value relevant by investors or whether ESG disclosures mitigate or exacerbate market frictions. These studies typically adopt event study models that evaluate abnormal returns, trading volume or dispersion in bid-ask spreads or analysts' forecasts as outcome variables. While no conclusion can be drawn with respect to the full body of literature, the identified subset of studies in this review suggests an overall positive association between ESG disclosures and performance and market efficiency outcomes, as summarised in Table 4.9. Still, the evidence is not unequivocally positive, as some studies suggest that markets do not efficiently integrate news on greenwashing and other controversies and that ESG disclosures are associated with uncertainty, misvaluation and overreaction. The evidence that markets tend to value ESG disclosures can be considered a precursor and necessary condition for ESG disclosures affecting allocation and cost of capital. Similarly, the evidence that ESG disclosures can mitigate or exacerbate market frictions might imply that they have the potential to influence allocation and cost of capital if such frictions persist long term.

Firm financial performance The literature linking firms' ESG performance and disclosures to their financial performance yields mixed results, as documented in Table 4.10. While several studies document positive relations between ESG performance and disclosure and financial performance indicators, valuation metrics or risk measures, others find no statistically significant association or report negative relationships. Which way the balance ultimately tips seems, unsurprisingly, to be associated with firm characteristics such as size and sector, and the markets' expectation around net costs or benefits associated with more stringent climate policies or disclosure requirements. However, whether and how ESG disclosures have an effect on firms' access and cost of capital through their real effect on firm value remains an open question.

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.

Voluntary versus mandatory disclosures

Based on the subset of studies identified in Section 4.3.3 that explicitly identify as studying mandatory or voluntary disclosures, this subsection examines whether capital market outcomes

Table 4.9: Association between ESG disclosures and market efficiency

This table summarises the literature investigating the relation between ESG disclosures and market efficiency outcomes. Findings are classified based on whether the study provides evidence consistent with the expected outcome (+), no or mixed evidence (0), or evidence that contradicts (-) the expected outcome (where the expected outcome is to be interpreted as the objective of ESG disclosure legislation). These classifications were made by the author. The references in italics represent grey literature.

Outcome	References	Key insights
Are ESG disclosures considered value-relevant?		
(+) yes	Bassen et al. (2025); Fiordelisi, Ricci and Santilli (2025); Birindelli, Miazza et al. (2023); Di Tommaso and Mazzuca (2023); Eisenkopf, Juranek and Walz (2023); Cellier, Chollet and Gajewski (2016); Ziegler, Busch and Hoffmann (2011); Birindelli, Chiappini and Jalal (2023)	Overall, this body of literature indicates that ESG disclosures as well as ESG-related performance indicators are relevant to investors and incorporated into asset prices. Climate policies and ESG disclosure regulations are likewise found to be value-relevant.
(-) no	Teti, Etro and Pausini (2024); Anselmi and Petrella (2025); *Mazzacurati (2023)*	This result is not unequivocal, however, since some studies indicate that the market does not react to greenwashing news and controversies, underscoring the lack of an efficient market mechanism to deter greenwashing behaviour.
Do ESG disclosures mitigate or exacerbate market frictions?		
(+) mitigate	Oehler and Horn (2025); Horky, Pasquali and Magazzino (2024); Del Rio, Ferrer and López-Arceiz (2024); R. Wang et al. (2024); M. Khan et al. (2024); Del Rio, López-Arceiz and Muga (2023); Arif, Gan and Nadeem (2022); Fuhrmann et al. (2017)	Moreover, the literature indicates that ESG disclosures may reduce market frictions. Several studies suggest that ESG disclosures can mitigate behavioural biases, such as optimism bias and market myopia. In addition, ESG disclosures, particularly when regulated or externally assured, are associated with lower levels of firm-specific volatility and reduced uncertainty about firm performance. Some studies further document that ESG disclosures are associated with narrower bid-ask spreads and lower analyst forecast dispersion. 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. Finally, rating disagreement appears to be perceived by the market as methodological noise rather than as a form of uncertainty that warrants a risk premium.
(-) exacerbate	Bachner (2025); Barka, Hamza and Mrad (2023); Birindelli, Chiappini and Jalal (2023)	At the same time, the studies referenced on the left find evidence that ESG disclosures may lead to increased uncertainty and disagreement (as reflected in lower or higher levels of abnormal trading volumes), misvaluation and market overreaction.

Table 4.10: Association between ESG disclosures and firm financial performance

This table summarises the literature investigating the relation between ESG disclosures and firm performance outcomes. Findings are classified based on whether the study provides evidence consistent with the expected outcome (+), no or mixed evidence (0), or evidence that contradicts (-) the expected outcome (where the expected outcome is to be interpreted as the objective of ESG disclosure legislation). These classifications were made by the author. The references in italics represent grey literature.

Outcome	**References**	**Key insights**
(+) increase firm value	Casciello, Maffei and Zampella (2025); Seefloth et al. (2025); Momtaz and Parra (2025); Dou et al. (2025); Tonnarello et al. (2025); Saha and I. Khan (2024); Hojer and Mataigne (2024); Khaireddine, Lacombe and Jarboui (2024); Porzio and Battaglia (2024); Sandberg, Al Sayed Noor and Tiberius (2023); Bruna et al. (2022); Sekerci et al. (2022); Landau et al. (2020); Grewal, Riedl and Serafeim (2019); Nekhili et al. (2017); Verbeeten, Gamerschlag and Moeller (2016); Gupta (2025); Gabrielli, Marchini and Baldini (2025)	The studies listed on the left find a positive association between ESG disclosures and a plethora of corporate financial performance indicators (such as EBIT, ROA, ROE, net income), valuation measures (book or market value, Tobin's Q) and risk (volatility). Interestingly, Bruna et al. (2022) finds evidence of a non-linear (U-shaped) relation based on firm size. Only high-ESG performers and medium or large size companies attain financial benefits.
(0) no effect	Neves et al. (2024); Doni and Fiameni (2024); Bianchi Martini et al. (2016); Kaspereit and Lopatta (2016)	The studies referenced on the left either find no association between ESG reporting and firm performance, or mixed results. The association between ESG disclosures or performance and firm financial performance depends on which performance measures are considered, the time period studied, and how innovative firms are. These findings suggest that the relation between ESG disclosures or performance and firm financial performance is likely to be moderated by various firm characteristics as well as investor perception.
(-) reduce firm value	Boungou and Dufau (2025); Momtaz and Parra (2025); Neves et al. (2024); Papathanasiou and Koutsokostas (2024); Bruna et al. (2022); Mittelbach-Hörmanseder, Hummel and Rammerstorfer (2021); Landau et al. (2020); Quéré, Nouyrigat and Baker (2018)	At the same time, the studies referenced here indicate that markets anticipate more stringent climate policies following the Paris Agreement, as well as disclosure regulations such as the NFRD and the CSRD, to generate regulatory risk and additional compliance costs for firms. These expectations are reflected in lower anticipated financial performance and firm value.

differ when disclosures are mandated rather than voluntary. For context, Tables 4.11 and 4.12 summarise the findings of the studies documented in Tables 4.3 and 4.4, respectively. The comparison focuses on evidence related to the EU sustainable finance framework.[15]

The evidence base on the effect of EU sustainable finance regulations on allocation and cost of capital for green investments is currently limited and incomplete. 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 the NFRD and the SFDR, adopted in 2014 and 2019, respectively. At the same time, the existing literature shows that implications for the cost of capital are underrepresented. 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 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; Boungou 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

[15] For an exemplary study on ESG disclosure regulation in the UK, please refer to (R. Wang et al., 2024).

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.

Table 4.11: Mandatory sustainability disclosure outcomes

References	CoC	CA	ME	FP	Measure	Key insight
Non-Financial Reporting Directive (NFRD)						
C. Huang and Mo (2025)		✓			ESG investment growth index	The introduction of the NFRD significantly enhanced ESG investment levels.
Minnetti et al. (2025)		✓/0			Short-term and long-term debt to asset ratio	The sustainability index is not significantly related to short-term bank debt, but shows a significant positive association with long-term debt.
P. Huang et al. (2025)				✓	Tobin's Q, Enterprise value to EBITDA	Double materiality reporting exhibits a statistically significant positive association with firm value.
Bruna et al. (2022)				✓	Financial performance index	The ESG–financial performance relation is non-linear: only high-ESG performers and medium or large size companies attain financial benefits. The ESG–financial performance relation becomes positive upon the introduction of the NFRD.
Arif, Gan and Nadeem (2022)			✓		Earnings risk (st.dev of analysts' forecasts)	The introduction of the NFRD improved ESG disclosure quality and led to lower uncertainty (earnings risk) in the market.
Grewal, Riedl and Serafeim (2019)			✓	✗	Cumulative abnormal returns	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)	✗				Yield to maturity, primary market	Investors seek greater compensation for EU Taxonomy compliance and asset framework risk factors.
Tonnarello et al. (2025)				✓	EBIT, ROE, ROA, Tobin's Q, Technical efficiency	Firms reporting TR alignment exhibit higher market value, profitability and efficiency than those that do not.
Bassen et al. (2025)			✓		Raw return, CAPM and Fama French adjusted returns, Cumulative abnormal returns (TR)	Capital markets demand a TR-alignment compensation, suggesting that investors already incorporate the TR into their decisions and channel capital toward TR-aligned firms.

References	CoC	CA	ME	FP	Measure	Key insight
Ghitti et al. (2025)	✓				Green bond premium	The market prices green bonds with top SPO labels at a premium, but this effect vanishes once credit ratings are considered, indicating that SPO labels do not provide extra priced information. The implementation of the TR increases green bond spreads.
Sustainable Finance Disclosure Regulation (SFDR)						
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 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, F. 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.

References	CoC	CA	ME	FP	Measure	Key insight
Schreiner and 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 4.3. 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 4.12: Voluntary sustainability disclosure outcomes

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, and 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.

References	CoC	CA	ME	FP	Measure	Key insight
Giannetti, Jasova et al. (2023)	0	✗			Volume of new loans offered, annualised interest rate offered	Banks that highlight the environment 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.
Carbone et al. (2021)	✓				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.
Pietsch and Salakhova (2022)	✓				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).
Balitzky and Reiche (2023)	0				Bond yield	There is no significant association between a bond being labelled as green bond, social bond or 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 4.4. 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 ✗.

Factors explaining heterogeneity in outcomes

Although a comprehensive assessment of the factors that moderate the relationship between ESG disclosures and capital market outcomes goes beyond the scope of this review, the literature points to several factors that warrant a brief mention. First, institutional and cultural context appears to matter. Although this review focuses exclusively on the EU and therefore does not allow systematic cross-institutional comparisons, some included studies comparing the EU and the US document heterogeneous market responses, suggesting that EU capital markets may respond more strongly to ESG disclosures than those in the US, likely due to varying expectations about the stringency of climate policies (Ziegler, Busch and Hoffmann, 2011; Carbone et al., 2021).

Other studies indicate that ESG disclosures are 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, there is evidence that the strategic withholding of negative ESG information and the selective disclosure of positive ESG news is more pronounced in more masculine cultural settings (de Vincentiis, 2024). Beyond culture, institutional features also appear to moderate observed outcomes. In particular, the ESG disclosure-capital market outcome relationship has been shown to depend on characteristics of the legal system (Priem and Gabellone, 2024; Mittelbach-Hörmanseder, Hummel and Rammerstorfer, 2021), as well as on the level of development of financial markets and financial institutions (Birindelli, Quas et al., 2025).

Second, the literature suggests that firm-level characteristics also play a moderating role. Several studies document heterogeneity across firms depending on size (Bruna et al., 2022), as well as differences related to management and board characteristics (Sekerci et al., 2022; Nekhili et al., 2017). These findings underline that ESG disclosures do not operate in a uniform manner across firms, even within a common regulatory environment.

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. However, because the identification and analysis of such moderators were not explicitly targeted by the review's search strategy, the evidence discussed here should be interpreted as illustrative rather than exhaustive and primarily serves to highlight avenues for further research rather than to establish systematic patterns.

4.4 Implications

This section reflects on the synthesis of the literature presented in this review with a view to addressing RQ 2 and RQ 3. Section 4.4.1 discusses limitations and gaps in the existing empirical evidence and outlines avenues for future research. Section 4.4.2 subsequently discusses policy implications.

4.4.1 Avenues for future research

The synthesis of the literature identifies several limitations and gaps in the existing evidence on the relation between ESG disclosures and the allocation and cost of capital for green investments.

Population With respect to the population studied, the identified literature predominantly concentrates on asset allocation by investment funds, particularly in the context of the SFDR, and loan provision and pricing by banks, often drawing on supervisory data. This emphasis is consistent with the traditionally bank-based structure of European financial systems and the growing role of non-bank financial intermediation. At the same time, there is scope to broaden the population studied to include other large and sophisticated institutional investors, such as pension funds and insurance companies, whose investment behaviour may materially influence capital market outcomes.

Intervention The review highlights two challenges related to the research on disclosure interventions (see also Section 4.3.2). First, a non-trivial share of the literature does not explicitly distinguish between voluntary and mandatory disclosure regimes, nor does it clearly specify the institutional or informational baseline against which disclosure effects are assessed. Failure to account for prior regulatory or voluntary policy exposure may attenuate or amplify estimated effects and complicates cross-study comparison. Second, there remains an inherent difficulty in disentangling ESG disclosures from underlying ESG performance. In voluntary disclosure settings, self-selection arises because firms with stronger ESG performance are more likely to disclose. Observed capital market outcomes may therefore reflect ESG performance, disclosure or both, as also noted by H. Christensen, Hail and Leuz (2021) in a US-focused context. While mandatory disclosure regimes may mitigate this bias to some extent, separating disclosure from performance remains challenging. Future research could address these challenges by consistently documenting whether disclosures are studied under voluntary or mandatory regimes and by carefully characterising disclosure attributes,

such as scope (single versus double materiality) and other relevant design features. In this regard, the global mandatory ESG disclosure regulation dataset developed by Krueger et al. (2024) constitutes an important step forward. Over time, the phased implementation of mandatory regimes may also create additional opportunities to better disentangle disclosure effects from performance. Finally, studies that examine the effects of ESG ratings may consider possibilities for differentiating disclosure quality scores from performance scores, in addition to the commonly used differentiation along the environmental, social and governance dimension.

Outcomes With respect to outcomes, the current evidence on the effects of ESG disclosures on the allocation and cost of capital remains limited, with considerable scope for expansion across both equity and debt markets. A substantial share of studies identified in this review focuses on short-term market efficiency effects and firm value or performance, rather than on realised financing outcomes. As discussed in Section 4.3.4, these outcomes constitute indirect channels through which ESG disclosures may affect capital allocation and pricing, but they do not in themselves provide evidence on changes in access to, or cost of, external finance.

In equity markets, future research could place greater emphasis on primary market outcomes, such as amounts raised and pricing in initial public offerings. In debt markets, the literature is currently dominated by studies on green bond yields or bank lending based on supervisory data. The evidence base on bank lending would benefit from complementing research by academics, acknowledging challenges related to data availability. Generally speaking, there is scope to deepen and broaden academic analysis across legislation, including the EU Taxonomy and the CSRD, as well as recently adopted legislation such as the European Green Bond Standard and the ESG Rating Regulation (Regulation (EU) 2024/3005). As these regulations are being phased in and the EU sustainable finance framework continues to evolve over time, systematic evaluation of intended effects as well as potential unintended consequences will become increasingly important.

Finally, while the literature on market efficiency and firm performance documents important associations between ESG disclosures and indirect outcomes, it remains largely silent on whether and how such short-term or intermediate effects translate into longer term changes in capital allocation or cost of capital. Bridging this gap, both theoretically and empirically, represents a promising direction for future research.

4.4.2 Policy implications

The emerging, but still limited, body of evidence reviewed in this study suggests that high-quality ESG disclosures and ESG performance are associated with improved access to capital and more favourable funding conditions. Although only a small subset of studies directly examines EU sustainable finance legislation, initial findings indicate that several of the positive associations documented under voluntary disclosure regimes may extend to mandatory disclosure frameworks.

At the same time, the evidence from the literature suggests that regulators should remain attentive to potential unintended effects. Several studies indicate that capital markets anticipate regulatory compliance costs and risks, which may be associated with heightened uncertainty and, in some settings, adverse effects on firm value and performance. These dynamics are likely to be transitory, reflecting adjustment processes in the early phases of implementation, but they nonetheless underline the importance of regulatory clarity and simplicity, proportionality and predictability in the design and sequencing of disclosure requirements. In this context, empirical 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.

Seen against this backdrop, recent adjustments introduced through the EU Sustainable Finance Omnibus Packages can be interpreted as a step in the direction of greater proportionality. Measures such as 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 the aim of preserving the informational value of ESG disclosures while limiting undue complexity, compliance costs and regulatory uncertainty. Overall, the available evidence suggests that carefully balancing harmonisation with flexibility and proportionality may help advance the EU's sustainable finance objectives while mitigating potential adverse effects for market functioning and competitiveness.

4.5 Conclusion

Against the background of the introduction of the EU sustainable finance framework, this study adopts a rapid review methodology to synthesise the emerging evidence on the effect of mandatory ESG disclosures on capital market outcomes. Specifically, the aim of this review is to answer the following research questions: *RQ1*: what evidence exists on the impact of voluntary and mandatory ESG disclosures on the mobilisation of private capital and cost of capital for green investments within the EU?; *RQ2*: What are the main gaps and limitations

in the existing empirical literature?; *RQ3*: What implications can be drawn from the current state of evidence for future research avenues and the ongoing policy debate?

This review documents that the current evidence base is limited and incomplete. However, while the evidence is not unequivocal, the identified body of literature reviewed in this study broadly suggests that high-quality ESG disclosures (considering both voluntary and mandatory disclosures) and ESG performance are associated with improved access to capital and more favourable funding conditions. Although only a small subset of studies directly examines EU sustainable finance legislations, initial findings indicate that several of the positive associations documented under voluntary disclosure regimes may extend to mandatory disclosure frameworks.

The current evidence base exhibits several gaps and limitations. First, in addition to studying ESG disclosures from firms' perspectives ('demand side'), the literature is currently concentrated on studying the investment allocation of investment funds and banks ('supply side'). There is scope to extend the evidence base to pension funds and insurance companies as important players in capital markets. Second, this study highlights limitations and challenges in the identification of the effect of ESG disclosures. Specifically, it suggests that a non-trivial share of the literature insufficiently makes explicit whether disclosures are studied under a mandatory or voluntary regime, and urges future research to adopt a more explicit identification of the regulatory regime and institutional context. Moreover, it points to the challenge of disentangling the effect of ESG disclosures from ESG performance, suggesting that future research may benefit from opportunities to study mandatory rather than voluntary disclosure regimes in the EU. Third, the number of studies that examine the relation between ESG disclosures and capital allocation and cost of capital is underrepresented; an unsubstantial share of identified studies focused on market efficiency and firm performance outcomes, which may only be indirectly associated with allocation and cost of capital outcomes. The literature on equity market outcomes is largely based on implied cost of capital from secondary market data, leaving room for future research to examine fund raising and pricing outcomes in primary markets. The academic literature on debt markets focuses on green bond yields. Supervisory authorities complement this body of literature by examining bank lending based on proprietary data. Overall, there is ample room for future research to deepen and broaden the evidence base on the effect of EU sustainable finance legislation on capital market outcomes

While the synthesis of the literature shows initial signs that mandatory ESG disclosures may be associated with a redirection of capital and more favourable funding conditions for green investments, the literature also suggests that regulators should remain attentive to potential unintended effects. Several studies indicate that capital markets anticipate regulatory

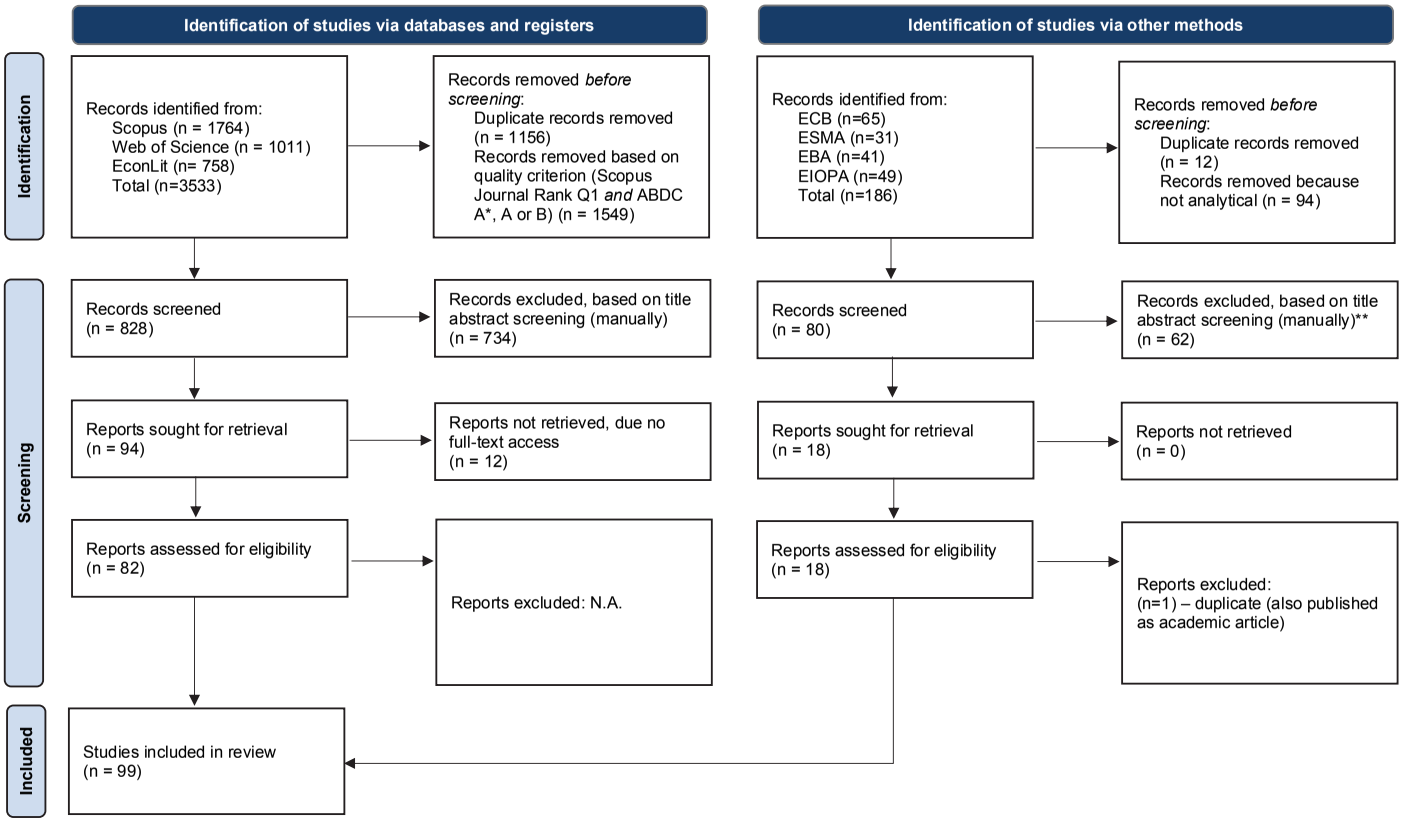
compliance costs and risks, which may be associated with heightened uncertainty and, in some settings, adverse effects on firm value and performance. This underlines the importance of regulatory clarity and simplicity, proportionality and predictability in the design and sequencing of mandatory disclosure requirements.

This study contributes to the extant accounting and finance literature on the effect of disclosures. Specifically, it contributes by synthesising evidence on the relation between ESG disclosures and allocation and cost of capital. Most of the existing literature focuses on financial disclosures, rather than ESG, or on voluntary disclosures, rather than considering both. Moreover, it uses the introduction of the EU sustainable finance framework as an empirical case, thereby complementing the literature, which predominantly focuses on the US. Finally, by adopting a review approach, this study complements a comprehensive review by H. Christensen, Hail and Leuz (2021), who comprehensively review evidence from a US perspective. This research is relevant for academics considering future work in the realm of ESG disclosures and for policymakers and regulators involved in sustainable finance legislation.

This study has several limitations. As part of the rapid nature of this systematic review, strict inclusion and exclusion criteria were applied in the selection process. Therefore, it is possible that this review missed some relevant studies on the effect of ESG disclosures on allocation and cost of capital. Moreover, while this review discusses how ESG disclosures may indirectly be associated with allocation and cost of capital via its relation with market efficiency or firm performance, this discussion cannot be considered comprehensive as these indirect channels were not explicitly targeted by the search strategy. Future research could revisit this systematic review. An update of this study would be warranted as the empirical evidence base grows. Moreover, there is scope to extend the review to include indirect channels, but also to dive deeper into different disclosure types and content (single versus double materiality; differentiating between environmental, social and governance disclosure content) and moderating factors including institutional, cultural and firm-level characteristics.

Appendix A: Figures

Figure 4.3: 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/

Appendix B: Tables

Table 4.13: 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"	*Geographical focus: the EU, euro area or EU Member States*
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"	*Mandatory ESG disclosures (legislation)*
	({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}	*Voluntary ESG disclosures*
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*)	*Allocation and cost of capital*

Notes: This table documents the Boolean search block syntax used to identify potentially relevant literature in Scopus. The search blocks were applied to the TITLE-ABS-KEY field, 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 4.14: 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"`	*Geographical focus: the EU, euro area or EU Member States*
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"`	*Mandatory ESG disclosures (legislation)*
	`("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 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"`	*Voluntary ESG disclosures*
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*`	*Allocation and cost of capital*

Notes: This table documents the Boolean search block syntax used to identify potentially relevant literature in Web of Science. The search blocks were applied to the Title, Abstract and Author Keywords fields, 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 4.15: 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")	*Geographical focus: the EU, euro area or EU Member States*
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"	*Mandatory ESG disclosures (legislation)*
	("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 legisl* 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"	*Voluntary ESG disclosures*
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*)	*Allocation and cost of capital*

Notes: This table documents the Boolean search block syntax used to identify potentially relevant literature in EconLit. The search blocks were applied to the Title (TI) , Abstract (AB) and subject (SU) fields, 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' records were included. The search was restricted to English-language publications with a publication date between 1 January 2010 and 31 December 2025.

Chapter 5

Conclusion

This concluding chapter synthesises the dissertation's findings in relation to the research questions and reflects on the overarching motivating question and contribution to the literature. It then discusses limitations of the research design and methods, identifies directions for future research and considers the implications of the findings for policy.

5.1 Summary of key findings and reflection on overarching question

Inspired by the introduction of the ambitious EU sustainable finance framework and the current knowledge gap on the relation between ESG disclosures and capital market outcomes, this dissertation set out to contribute to answering the overarching question: *Can ESG disclosures, whether voluntary or mandatory, reduce information asymmetries in a way that materially affects (cross-border) allocation and cost of capital for green investments in the EU?*

Part I – Capital market integration and voluntary ESG disclosures in emerging euro area green bond markets

To address the motivating question, Part I examined how voluntary ESG disclosures relate to cross-border capital allocation in the EU. The EU sustainable finance framework aims to reduce information asymmetries by improving the transparency, comparability and credibility of ESG disclosures, partly to facilitate *cross-border* investment in green projects. However, an improved information environment does not automatically translate into more cross-border investment, since investors must also be willing to act on information about foreign firms. To investigate this, Part I used the nascent and largely unregulated euro area green bond markets

as an empirical case study, exploiting the likely salience of supply constraints and information asymmetries.

Specifically, Chapter 2 asked whether investors who gained familiarity with foreign markets by investing abroad, due to the absence of a domestic market, prefer their home market once it becomes available. A first exploration of market developments showed that between 2014 and 2021, green bond markets exhibited lower levels of home bias than conventional bond markets, suggesting that green bond markets started off more integrated. As markets developed, however, green bond home bias showed a rising trend. Panel regression results corroborate this pattern, suggesting that euro area investors who familiarised themselves with foreign markets by holding only foreign green bonds in the absence of a domestic market shift their portfolios towards domestic green bonds as soon as these become available. Home bias then declines briefly before rising again as the domestic market develops. The estimated regressions imply that average green bond home bias in the euro area converges to conventional bond home bias once domestic green bond markets reach, on average, 6% of the size of their respective conventional bond markets. Chapter 2 subsequently performed additional panel regression analyses to examine whether banks' sustainability ambitions could be associated with the observed lower levels of initial green bond home bias, but found no general support for this. Any negative association between banks' sustainability ambition and home bias is significant only in countries with relatively more developed domestic green bond markets, and it dissipates as banks rebalance towards domestic green bonds as the home market expands.

Chapter 3 then examined whether adopting a voluntary ESG disclosure standard can help firms attract foreign investors to their green bond issuances, thereby reducing home bias for these bonds. A cross-sectional exploration of the data suggested that voluntary ESG disclosures are associated with lower green bond home bias for 'low-risk' bonds but with higher home bias for 'high-risk' bonds, and that these estimated associations are larger for bonds issued outside the top three issuer countries. Extending the analysis to temporal patterns using panel regression methods yielded only weak evidence of a negative association between climate-related disclosures and green bond home bias, with results again largely driven by issuers in countries whose green bond markets are in earlier stages of development. Since firms decide themselves whether and when to adopt the disclosure standard, adopters are likely to differ systematically from non-adopters. Consistent with this concern, an initial comparison indicates that adopters tend to be larger firms that issue larger volumes of bonds, which are characterised by longer maturities and larger issue sizes. A subsequent logistic regression of adoption status further suggests that larger and non-financial firms have a higher propensity to adopt the climate disclosure standard, while firms in jurisdictions in the top

25% in terms of legal systems supporting the swift resolution of insolvency cases have a lower likelihood of adoption. Finally, an event study based on a sample of firms that are comparable across these firm, sector and country characteristics shows that, prior to adoption, green bond home bias for eventual adopters was not significantly different from home bias for non-adopters. After adoption, home bias appears to decline, but any indications of a reduction are short-lived and dissipate after a few quarters.

Collectively, these findings suggest that even if ESG disclosures reduce information asymmetries, they do not necessarily generate more cross-border investment or deeper capital market integration. Investors' tendency to reorient portfolios towards domestic markets after gaining experience abroad underscores the universal nature and persistence of home bias. The finding that the 'disclosure-home bias' link varies with green bond risk and market maturity suggests that product risk and complexity, and unfamiliarity with foreign markets, moderate how investors act on disclosed information, which may help reconcile mixed results in the literature. For low-risk bonds, the negative association between ESG disclosures and green bond home bias is consistent with disclosures reducing information barriers to cross-border capital flows, as suggested by Eichler (2012) and documented by Leuz, Lins and Warnock (2009), Dahlquist et al. (2003), Gelos and Wei (2005), Aggarwal, Klapper and Wysocki (2005), Bradshaw, Bushee and Miller (2004) and Ahearne, Griever and Warnock (2004). The finding that the negative association between disclosure and home bias is more pronounced in green bond markets in earlier stages of development is also in line with this interpretation. In contrast, the positive association for high-risk bonds aligns with the specialisation view of Lundtofte (2009) and Van Nieuwerburgh and Veldkamp (2009). It is consistent with evidence that US investors display local preferences for small, highly levered firms producing non-traded goods (Coval and Moskowitz, 1999) and with evidence that Finnish investors prefer local firms that communicate in their native language and whose executives share a similar cultural background (Grinblatt and Keloharju, 2001).

Part II - Emerging evidence on the impact of EU sustainable finance legislation on allocation and cost of capital for green investments in the EU

Part II broadened the analysis to EU capital markets, moving beyond euro area green bond markets, examining both voluntary and mandatory disclosures and shifting the focus from cross-border investment to wider capital market outcomes. In this context, Chapter 4 asked: What evidence exists on the impact of voluntary and mandatory ESG disclosures on the mobilisation of private capital and the cost of capital for green investments within the EU?

Chapter 4 documented that the current empirical evidence base is still limited and fragmented. Nevertheless, the literature provides initial signs that high-quality ESG disclosures, whether voluntary or mandatory, and ESG performance are associated with improved access to capital and more favourable funding conditions. At the same time, the literature hints at countries' cultural and institutional characteristics (Ziegler, Busch and Hoffmann, 2011; Carbone et al., 2021; Casciello, Maffei and Zampella, 2025; de Vincentiis, 2024; Priem and Gabellone, 2024; Mittelbach-Hörmanseder, Hummel and Rammerstorfer, 2021; Birindelli, Quas et al., 2025), as well as firm-specific characteristics (Bruna et al., 2022; Sekerci et al., 2022; Nekhili et al., 2017), as potential factors that moderate the relation between ESG disclosures and capital market outcomes. While only a small subset of studies directly examines EU sustainable finance legislation, initial findings suggest that mandatory ESG disclosures may influence the allocation and cost of capital for green investments in line with intended policy objectives. Quite naturally, the evidence base on mandatory disclosures predominantly focuses on earlier legislation, the NFRD and SFDR. The emerging evidence suggests that the introduction of this legislation is associated with shifts in capital allocation towards green investments (C. Huang and Mo, 2025; Minnetti et al., 2025). In addition, initial evidence suggests that alignment with the TR definitions of what counts as green or sustainable translates into lower green bond rates (Ghitti et al., 2025).

However, the literature also points to unintended consequences associated with the EU sustainable finance legislation. 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; Boungou 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 unintended effects.

Reflection on motivating research question

Reflecting on the motivating research question, the studies assembled in this dissertation suggest that ESG disclosures are associated with a reallocation of capital towards green investment projects and lower related funding costs. However, these effects may not apply uniformly across different settings as they vary with countries' cultures and institutions as well as with firm-specific characteristics. In addition, while the emerging evidence base on the effects of EU sustainable finance legislation remains limited, initial findings suggest that, notwithstanding transitional challenges, such legislation is associated with capital market outcomes that are broadly in line with its intended policy objectives. One exception concerns cross-border investing. The findings in this dissertation suggest that investor home bias is a universal and persistent phenomenon. Even if EU sustainable finance legislation enhances the transparency, comparability and credibility of ESG disclosures, and thereby reduces information asymmetries, this may not necessarily translate into further capital market integration in the EU. Strategic specialisation, behavioural biases and investor preferences may partly explain why an improved information environment alone may not be a sufficient condition for cross-border investment. Taken together, these findings highlight both the capital allocation effects associated with ESG disclosures and the limits of improved disclosure in overcoming persistent barriers to cross-border investment.

Contribution

This dissertation adds to the literature and contributes to addressing the research gaps identified in Section 1.1 in three main ways. First, it offers a novel perspective on the relation between corporate disclosures and capital market outcomes, with a particular focus on cross-border capital allocation, or home bias. By exploiting the institutional context of the emerging euro area green bond market and using unique and confidential Eurosystem data on euro area bond holdings, the dissertation documents investors' preference for domestic assets even after they have acquired information about foreign assets. In other words, investors do not seem to fully exploit previously acquired knowledge about foreign firms in their investment decisions. This is the case even if investors have a comparatively high sustainability ambition. The dissertation thus adds to the literature by exploiting supply constraints and exploring behavioural factors as drivers for cross-border investment. Second, this dissertation adds to the still limited but growing literature on ESG disclosures. By combining the unique and confidential Eurosystem data on euro area bond holdings with data on firms' adoption status of the first international climate-related financial disclosure standard by the FSB's

TCFD, it examines whether firms that adopt the disclosure standard are able to attract more foreign investors to the green bonds they issue. In doing so, it complements the large body of evidence on financial disclosures and speaks to the limited transferability of insights from financial to ESG disclosure settings highlighted in the literature. Finally, the dissertation addresses the relative scarcity of evidence on mandatory disclosure regimes by synthesising empirical evidence on the relation between voluntary and mandatory ESG disclosures and the allocation and cost of capital for green investment projects within the EU. By identifying patterns, gaps and limitations in the current literature, the chapter provides a structured overview of what is known and where evidence remains inconclusive and further research is warranted.

5.2 Limitations

While this dissertation contributes to the emerging literature on ESG disclosures and capital market outcomes, several limitations warrant consideration. Recognising these limitations is important to interpret the findings and identify avenues for future research.

A first limitation concerns the validity of using the adoption of a voluntary ESG disclosure standard as a proxy for banks' latent sustainability ambition, as in Chapter 2. This mapping may be imperfect because adoption can reflect multiple motives beyond intrinsic preferences. Some genuinely sustainability-oriented banks may not adopt the specific standard during the observation window because they already rely on alternative reporting frameworks for sustainability disclosures, so non-adoption does not necessarily imply low ambition. Conversely, other banks may adopt primarily in response to reputational or legitimisation concerns, or as a practical way to operationalise evolving disclosure expectations, including legislation, rather than because they have intrinsically stronger 'green' preferences. In these cases, adoption status becomes a noisy indicator of the underlying construct of interest. Several alternative approaches may mitigate this concern to some extent. For example, the proxy could be based on whether a firm adopts one or more other voluntary disclosure standards, whether its disclosures receive external assurance, or on textual analysis of disclosure reports to extract differences in tone and content. However, accurately measuring a latent construct remains inherently challenging, and alternative proxies may be subject to similar concerns. Against this background, the decision to focus on the first climate-related financial disclosure standard (Financial Stability Board Task Force on Climate-related Financial Disclosures, 2017) is motivated by the expectation that banks that view climate risk as salient will act as early movers in disclosure, before it becomes standard market practice.

A second limitation pertains to self-selection in ESG disclosure, which may confound the observed link between adoption and home bias in firms' green bonds in Chapter 3. Since firms themselves decide whether and when to adopt the disclosure standard, it is challenging to disentangle the association between ESG disclosures and green bond home bias from other factors that influence both adoption status and home bias. Chapter 3 showed that firms that adopt the disclosure standard are, on average, larger in terms of total assets, issue larger volumes of bonds that have longer maturities and are of larger issue size. Any negative association found between the adoption of the disclosure standard and home bias might therefore simply reflect the association with firm size and overall presence in capital markets. Chapter 2 aimed to reduce this self-selection bias by adopting an event study based on a sample of firms that are matched on country, sector and firm characteristics that are associated with the propensity to adopt the disclosure standard. However, the nature of the data limited the effectiveness of this approach. Even though the data contained a reasonable number of green bonds and variation in issuer firm adoption status, only a small number of firms adopted the disclosure standard prior to issuing green bonds. Because green bond home bias was observed both before and after adoption for only a small number of firms, and matching further reduced the usable sample, the matched event study design offered limited scope for identification.

A third limitation relates to constraints on statistical inference regarding the association between firms' adoption status and investor home bias in their green bond issues. Chapter 3 documents several characteristics of the nascent euro area green bond market that constrain statistical precision. First, because most adopting issuers only begin issuing green bonds after adoption, the number of bond-quarter observations available for estimating the relation between disclosure adoption status and home bias is limited. This reduces statistical power and makes it difficult to detect economically meaningful effects with precision. At the same time, euro area green bond markets exhibit uneven development over time and a strong concentration of issuance in a small set of countries and sectors. If regression residuals are correlated within countries or sectors, heteroscedasticity-robust errors do not account for such within-group dependence and can understate uncertainty, leading to overly narrow confidence intervals and over-rejection of null hypotheses. Chapter 3 aimed to address potential within-group correlation by clustering standard errors at the country or sector level, but inference can remain fragile when the number of clusters is small, limiting the reliability of conventional cluster-robust procedures in this setting.

A fourth limitation has to do with the 'rapid' nature of the systematic literature review in Chapter 4. As part of the methodological strategy, strict inclusion and exclusion criteria were applied, which could have resulted in some relevant studies on the effect of ESG disclosures

on the allocation and cost of capital being excluded from the review. In addition, the rapid review focused on synthesising direct empirical evidence on the association between ESG disclosures and the allocation and cost of capital for green investment projects. Thus, the search strategy did not target potential indirect channels through which ESG disclosures could affect the capital market outcomes of interest, or potential moderating factors. While the review discussed such indirect channels and moderating factors to the extent that these were addressed in identified studies captured by the search strategy, the discussion cannot be considered comprehensive. Finally, since the evidence base on the relationship between voluntary or mandatory ESG disclosures and the allocation and cost of capital for green investments is still limited, an update of the review would be warranted as the evidence base expands.

A final limitation is of a slightly different nature and relates to common identification challenges in the empirical literature on the association between ESG disclosures and capital market outcomes, as reviewed in Chapter 4. First, a non-trivial share of this literature does not make sufficiently clear whether ESG disclosures are studied under a mandatory or a voluntary regime. This matters because mandatory requirements may condition the estimated effects attributed to adherence to voluntary standards. If the two act as substitutes, failing to account for prior regulatory exposure could attenuate estimated effects. If, by contrast, mandatory regimes strengthen credibility, comparability or enforcement, estimated effects attributed to voluntary adoption may be overstated. Second, the literature highlights the challenge, also flagged by H. Christensen, Hail and Leuz (2021), of disentangling the effects of ESG disclosure from ESG performance, particularly given firms' self-selection in voluntary ESG reporting. Recognising these challenges is important in terms of interpreting the evidence presented in this literature and informing avenues for future research.

5.3 Directions for future research

Building on the preceding discussion of key findings and limitations, several avenues for future research can be identified.

First, a key question for future research is whether limited integration of green capital markets constitutes a bottleneck for the green transition. The finding that home bias increases as euro area green bond markets develop leaves the question open whether this results in funding constraints for firms seeking to finance their transition. Addressing this question requires greater clarity on what drives changes in home bias and why they may or may not be consequential. Home bias is a relative measure and does not, by itself, reveal whether

firms face tighter financing conditions in absolute terms. Increases in home bias may reflect investors adding more domestic bonds relative to foreign bonds as local markets expand, without reducing foreign investment in absolute terms. However, home bias may also rise because investors actively divest foreign holdings. This mechanism could narrow the investor base and reduce liquidity, with potentially more substantive implications for issuance conditions in terms of both quantities and pricing. Future research could therefore distinguish more explicitly between domestic tilting and foreign divestment and examine how each mechanism relates to market liquidity and firms' access to, and cost of, external capital.

Second, related to firms' incentives to disclose, future research could investigate whether firms strategically time voluntary ESG disclosures, and whether firms that do so are able to raise more funds on more favourable terms. The observation that firms tend to adopt a voluntary disclosure standard prior to issuing their first green bond suggests that they may send a strategic signal to the markets to raise funds. Such work would need to be mindful that firms self-select in both disclosure and external financing decisions. Taken together, these questions speak to the conditions under which firms choose to disclose, and whether disclosure is associated with more favourable financing outcomes at the point of market entry.

Third, with respect to investors' incentives to act on disclosures, a related question concerns which factors could potentially moderate the association between ESG disclosures and capital market integration. While this dissertation did not find general evidence of a significant negative relation between ESG disclosures and investor home bias, it suggested that the association may depend on the risk and complexity of the financial asset being traded. Future research could focus on investigating for which financial instruments and market segments ESG disclosures foster capital market integration, and in which markets disclosure may foster local specialisation. Relatedly, future work could also investigate whether the effect of disclosures varies across market participants, for instance professional versus retail investors, or short-term versus long-term oriented investors. Finally, while this dissertation suggests that a reduction in information asymmetries alone is not sufficient to incentivise cross-border investment, future research could examine which other drivers account for the persistence of home bias in green capital markets and which policy-relevant frictions may limit cross-border investment even in the presence of improved disclosure. Such work could help clarify the conditions under which ESG disclosure regulations are likely to be effective.

Fourth, moving beyond green capital market integration, substantial scope remains for future research on how ESG disclosures affect capital allocation and the cost of capital, particularly as the EU sustainable finance framework evolves. A central priority for future research is a more systematic evaluation of mandatory ESG disclosure regulation. While the emerging empirical evidence understandably centres on earlier legislative acts, further work is

needed to evaluate more recent legislation and the impact of subsequent amendments as the EU sustainable finance framework continues to evolve. Importantly, such evaluation should cover both intended capital market outcomes and unintended consequences, including ambiguity around the definition of 'what is green', regulatory uncertainty, anticipated compliance costs, strategic responses such as 'boilerplate' reporting or greenwashing, and enforcement.

Beyond regulatory evaluation, there is scope to strengthen the evidence base on realised capital market outcomes of ESG disclosures, whether voluntary or mandatory. A first gap is that much of the literature focuses on market efficiency or firm performance, which are valuable outcomes in their own right but may translate into changes in capital allocation and the cost of capital only indirectly. Further work is therefore needed to estimate more directly how ESG disclosures affect capital allocation and the cost of capital. A second, related gap concerns the type of evidence used. Even studies that speak more directly to capital allocation and funding costs often rely on secondary-market outcomes and proxies. Greater attention to primary-market outcomes would be particularly valuable, as these more directly indicate whether firms face financing constraints. In parallel, research could broaden coverage of relevant market participants. Supply-side evidence in the academic literature is currently concentrated on investment funds, while grey literature by supervisory authorities focuses on bank lending; other large institutional investors, notably pension funds and insurers, remain underrepresented despite their potential to materially shape green capital market outcomes given their long investment horizons. Finally, future work should examine factors that may moderate the relationship between ESG disclosures and capital market outcomes, including cultural, institutional and firm-specific characteristics. Understanding these moderators is not only of intrinsic academic interest, but also relevant for informing ongoing policy design as the EU sustainable finance framework evolves.

Fifth and lastly, this dissertation highlights two recurring methodological challenges in research on ESG disclosures. First, studies do not always manage to distinguish explicitly between voluntary and mandatory disclosure regimes, nor do they specify the institutional and informational baseline against which disclosure effects are assessed. This complicates interpretation of estimated relationships. Second, it remains challenging to disentangle the effects of ESG disclosure from underlying ESG performance, particularly in voluntary settings, as also noted by H. Christensen, Hail and Leuz (2021). Future research could address these challenges in several ways. A first step is to document more consistently whether disclosures are examined under voluntary or mandatory regimes and to characterise baseline context and prior regulatory or voluntary policy exposure. Without a clear baseline, it is difficult to infer what the disclosure intervention changes relative to existing reporting practices and rules. In addition, future work could describe disclosure attributes more systematically, including

scope ('single' versus 'double materiality') and other relevant design features. In this regard, the global mandatory ESG disclosure regulation dataset developed by Krueger et al. (2024) constitutes an important step forward. Over time, implementation of mandatory regimes may also create further opportunities to better disentangle disclosure effects from performance. Finally, studies examining the effects of ESG ratings could consider differentiating disclosure quality scores from performance scores, in addition to the commonly used differentiation along the environmental, social and governance dimension.

5.4 Policy implications

The research undertaken in this dissertation is intended to inform policy discourse on the ongoing calibration of the EU sustainable finance framework (see Box 1 in Chapter 1 for an overview of the framework). While the analysis points to a clear need for further research on ESG disclosures and capital market outcomes, the dissertation closes by setting out four broad policy implications that follow from the findings.

First, although the empirical evidence on the effects of the EU sustainable finance framework remains limited and fragmented, the emerging evidence reviewed in Chapter 4 provides preliminary indications that several elements operate in the intended direction. In particular, the introduction of the NFRD and SFDR has been associated with shifts in capital allocation towards greener investments in parts of the literature. In addition, early studies suggest that the Taxonomy Regulation may be associated with lower funding costs for 'dark green' bonds. At the same time, further evidence is needed to better understand whether the package of legislative acts adopted under the EU sustainable finance framework collectively delivers the intended capital market outcomes.

Second, the EU's mid-course recalibration of the sustainable finance framework through the Omnibus packages appears to be a step in the right direction in responding to stakeholder concerns about how to balance sustainability objectives with global competitiveness and adaptability, as also emphasised in the Draghi report (Draghi, 2024). The dense and interwoven set of legislative initiatives, sometimes characterised as a 'regulatory tsunami' (Zukas, 2023), has contributed to complexity, regulatory uncertainty and compliance costs. Chapter 4 documents that the emerging literature suggests that such complexity can be counterproductive and result in unintended consequences such as market inefficiencies and lower firm performance and value. Without attempting to be exhaustive, two salient amendments are the scope reductions of the CSRD and the CSDDD. The CSRD now targets only the largest companies and reduces the reporting population by an estimated 80%,

which materially tilts the balance towards proportionality and competitiveness. A similar logic underpins the scope reduction for due-diligence reporting under the CSDDD, as it likewise focuses on the largest firms and thereby shields other firms in the value chain from extensive information requests. The reviewed literature suggests that these amendments could be associated with more favourable performance and valuation outcomes for smaller and medium-sized firms, for which markets appear to have anticipated that compliance costs would outweigh benefits. Going forward, the European Commission could consider assessing in greater detail, where feasible, for which types of firms, for example by size or sector, the costs of disclosure under different reporting regimes may outweigh the benefits, thereby strengthening the proportionality analysis in its impact assessments.

Third, the ongoing review of the SFDR has the potential to improve clarity and simplicity, while mitigating boilerplate reporting and greenwashing concerns. The literature suggests that mandatory disclosure regimes may give rise to boilerplate reporting and greenwashing, particularly when definitions and metrics are unclear or inconsistently applied. The emerging empirical evidence on the SFDR similarly suggests that market participants have struggled with interpretation and implementation, and that the definition or metric used to operationalise 'sustainable' or 'green' can substantially influence whether a positive association between ESG disclosures and shifts towards 'green' investment is observed. Against this background, the European Commission's proposal to revise the SFDR (European Commission, 2025c) would substantially simplify disclosure requirements, introduce a mandatory product categorisation regime based on clearly defined sustainability criteria (to mitigate misuse of the Article 8 or 9 labels) and add explicit anti-greenwashing provisions in the form of naming restrictions and marketing requirements. Regarding the latter, the proposal would reserve sustainability-related names and marketing claims for products that qualify under one of the new SFDR categories (transition, ESG basics or sustainable) and require any such claims to be clear, fair, not misleading and consistent with the product's actual strategy and category. Taken together, these elements directly address several of the core challenges identified in the literature and have the potential to materially mitigate boilerplate reporting and greenwashing.

Fourth, it seems unlikely that the EU sustainable finance framework, in and of itself, can substantially advance capital market integration in the EU. While this dissertation does not directly estimate the association between mandatory ESG reporting under the EU framework and cross-border investment, its findings suggest that investor home bias remains persistent and that reducing information frictions alone may not be sufficient to induce cross-border capital flows. This implies that, if further integration of green capital markets is considered desirable for the green transition, complementary measures are likely to be required. The Savings and Investments Union strategy provides the most directly relevant European policy

context for such efforts, given its focus on deepening market integration and channelling savings into productive investment across the EU. At the same time, key institutional barriers to capital market integration, such as taxation and insolvency frameworks, remain within the remit of EU Member States. Ultimately, however, the extent to which integration initiatives can foster cross-border investment may be structurally bounded by investors' persistent preferences for domestic or local investment.

In conclusion, these findings suggest that while the EU sustainable finance framework shows early signs of influencing capital market outcomes in the intended direction, its effectiveness critically depends on ongoing calibration to balance the informational needs of market participants with the need to mitigate unintended consequences, including disproportionate compliance burdens, regulatory uncertainty and complexity, and unintentional or strategic boilerplate or greenwashing disclosure practices. Moreover, they point to the importance of embedding disclosure-based interventions within a broader policy mix, recognising both the complementarities with other integration measures and the structural limits to what such frameworks can achieve in shaping investor behaviour.

Annex I – Chapter overview

Table 1 provides an overview of the studies assembled in this dissertation. It states the research questions and documents the main data sources and methods used. When a study is joint work, it lists the co-authors and details the authors' contribution. It also credits other contributors where applicable. Finally, the table documents each study's publication status.

Table 1: Chapter overview

Chapter 2	
Green bond home bias and the role of supply and sustainability preferences	
Research questions	RQ1: Is the acquisition of knowledge about foreign firms through foreign investment, in the context of a scarce or absent domestic market, associated with persistently lower levels of investor home bias in green bond markets? RQ2: What is the link between banks' sustainability ambition and home bias in their green bond portfolios?
Main data sources	The study uses confidential bond-level holdings data of euro area investors between Q4 2013 and Q3 2021 in combination with Bloomberg green bond labels. Bond holdings are observed at the country-sector level and at individual bank level for the largest banking groups. Banks' sustainability ambition is proxied by whether the bank became a supporter of the Financial Stability Board's industry-led Task Force on Climate-related Financial Disclosures (TCFD). A list of supporting entities was publicly available.
Methods	The study employs panel regression estimation techniques.
Co-authors	Author contributions (CRediT) M. Wedow: Conceptualisation; Supervision; Writing – Review & Editing C. Lambert: Methodology; Supervision; Writing – Review & Editing A. Levels: Methodology; Investigation; Data curation; Formal analysis; Visualisation; Writing – Original Draft; Writing – Review & Editing All authors read and approved the final manuscript

	Methodology - continued
Other contributors	I would like to thank Barbara Attinger, Martijn Boermans, Maurice Bun, Frank Elderson, Philipp Hartmann, Jérôme Henry, Iman van Lelyveld and Isabel Schnabel as well as participants of the DNB research seminar series for valuable comments and suggestions. I furthermore would like to thank Melanie Chaves, David Ceysar Heymann and Christian Bernhard Mücke for their research assistance.
Publication status	Submitted to *Journal of International Money and Finance* on 27 July 2025; invited to revise and resubmit on 30 July 2026. Working paper: Levels, A., Lambert, C., & Wedow, M. (2023). *Green bond home bias and the role of supply and sustainability preferences* (DNB Working Paper No. 767). De Nederlandsche Bank.
	Chapter 3 *Climate-related disclosures and green bond home bias*
Research question	RQ1: Can voluntary climate-related disclosures help companies attract foreign investors to their green bond issuances, thereby reducing investor home bias?
Main data sources	The study uses confidential bond-level holdings data of euro area investors between Q1 2014 and Q1 2022 in combination with Bloomberg green bond labels and the introduction of the first global climate-related financial disclosure standard by the TCFD. Bond holdings are observed at the country-sector level.
Methods	The study employs a combination of cross-section regression estimation, panel regression estimation and an event study based on a matched set of firms.
Co-authors	-
Other contributors	I would like to thank Martijn Boermans, Maurice Bun, Eelke de Jong and Iman van Lelyveld as well as participants of the DNB research seminar series for valuable comments and suggestions.
Publication status	DNB working paper (forthcoming).
	Chapter 4 *Do ESG disclosures affect the allocation and cost of capital for green investments in the EU?*
Research questions	RQ1: What evidence exists on the impact of voluntary and mandatory ESG disclosures on the mobilisation and cost of private capital for green investments in the EU? RQ2: What are the main gaps and limitations in the existing empirical literature?

Methodology - continued	
	RQ3: What implications can be drawn from the current state of evidence for future research avenues and the ongoing policy debate?
Main data sources	Academic databases (Scopus, Web of Science, EconLit) and grey literature from EU authorities, resulting in 99 eligible studies published between 2010 and 2025.
Methods	The study adopts a rapid review approach, structuring the evidence within a population–intervention–outcome framework that is further complemented with an analysis of underlying mechanisms.
Co-authors	-
Other contributors	I would like to thank Eelke de Jong and Iman van Lelyveld for their valuable comments and suggestions. Furthermore, I would like to thank Norma Fötsch for critically reviewing the search strategy and search query and providing valuable feedback.
Publication status	Working paper: Levels, A. (2026). *ESG Disclosure and Green Investment in the EU* (DNB Working Paper No. 867). De Nederlandsche Bank.

Annex II – Data management

Table 2 provides an overview of the data management related to the studies assembled in this dissertation.

Table 2: Data management

Chapter 2	
Green bond home bias and the role of supply and sustainability preferences	
Main data sources	Chapter 2 of this dissertation is mainly based on the Securities Holdings Statistics (SHS) from the European System of Central Banks (ESCB). This confidential database contains detailed information on the holdings of long-term (maturity > 1 year) debt securities by euro area residents, reported on a quarterly basis. There are two versions of the Securities Holdings Statistics. The first version reports bond-level ownership positions at the country-sector level (SHSS). The second version of the Securities Holdings Statistics contains bond-level ownership positions at the bank level, for the largest euro area banking groups (SHSG). These data are available at bank entity level. Chapter 2 makes use of both the sectoral (SHSS) and banking group (SHSG) databases. The SHS data are augmented with Bloomberg green bond labels, web-based information on TCFD supporter status and Bureau van Dijk Orbis bank group data.
Ownership	The data for this chapter are owned by the European Central Bank (ECB).
Storage	The data are stored on ECB servers and meet the applicable security standards set by the institution. The data are not allowed to be stored outside this secured environment.
Accessibility and replicability	The code used in the data generation process is available from the corresponding author upon reasonable request. Requests may be sent to: Claudia.Lambert@ecb.europa.eu.
Chapter 3	

Data management - continued	
	Climate-related disclosures and green bond home bias
Main data sources	Chapter 3 of this dissertation is mainly based on the Securities Holdings Statistics (SHS) from the European System of Central Banks (ESCB). This confidential database contains detailed information on the holdings of long-term (maturity > 1 year) debt securities by euro area residents, reported on a quarterly basis. There are two versions of the Securities Holdings Statistics. The first version reports bond-level ownership positions at the country-sector level (SHSS). The second version of the Securities Holdings Statistics contains bond-level ownership positions at the bank level, for the largest euro area banking groups (SHSG). These data are available at bank entity level. Chapter 3 makes use of the sectoral (SHSS) database. The SHS data are augmented with Bloomberg green bond labels, web-based information on TCFD supporter status, Bureau van Dijk Orbis company data and World Bank resolving insolvency indicators.
Ownership	The data for this chapter are owned by De Nederlandsche Bank (DNB).
Storage	The data for this chapter are stored on DNB servers, which meet the applicable security standards set by the institution. The data are not allowed to be stored outside this secured environment.
Accessibility and replicability	The code used in the data generation process is available from the corresponding author upon reasonable request. Requests may be sent to: a.l.levels@dnb.nl.
Chapter 4	
Do ESG disclosures affect the allocation and cost of capital for green investments in the EU?	
Main data sources	The literature review is based on three academic databases (Scopus, Web of Science and EconLit) and grey literature retrieved from the ECB, EBA, ESMA and EIOPA.
Ownership	The academic databases were accessed through Radboud University via a licensed subscription.
Storage	The review materials and associated documentation underlying this chapter are stored on Radboud University servers, which comply with the institution's applicable security standards. In line with the requirements of scientific integrity, these materials will be securely retained for a minimum period of ten years.

Data management - continued	
Accessibility and replicability	To support the transparency and replicability of the identification and screening process adopted for the literature review, Chapter 4 provides a detailed description of the search strategy and documents the search queries used in the academic database searches. 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. Requests may be sent to: a.l.levels@dnb.nl.

Annex III – Declarations

Affiliation The analyses and conclusions contained in this dissertation 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 the author's own.

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Declaration of generative AI and AI-assisted technologies in the writing process During the preparation of this dissertation, the author used AI tools (Writefull, Microsoft 365 Copilot) 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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Non-technical summary

This dissertation examines green capital markets in the European Union (EU) and asks whether better disclosures on environmental, social and governance (ESG) aspects can help investors redirect capital towards 'green' projects and improve funding conditions for firms, including across borders.

The dissertation is motivated by the sustainable finance framework that the EU has developed since 2018. This framework was introduced as part of the EU's objective of becoming climate neutral by 2050, which requires substantial adjustments to the European economy. Because public budgets are limited, the transition to a more sustainable economy largely depends on private investors directing more capital towards green projects. To support this, the EU has introduced rules intended to improve the quality and reliability of firms' ESG disclosures. The idea is that better information helps investors make better-informed decisions and supports the flow of capital towards green investments across borders within the EU. Firms, in turn, may benefit from better access to funding and more favourable funding conditions. However, whether these ESG disclosure rules can influence capital market outcomes in line with the EU's policy objectives remains an open question.

Against this background, this dissertation seeks to contribute to answering the overarching question of whether ESG disclosures, whether voluntary or mandatory, can reduce investors' information problems in ways that materially affect the allocation and cost of capital for green investments, including across borders, in the EU. To address this overarching question, the dissertation assembles three self-contained studies that are organised in two parts.

Part I (Chapters 2 and 3) uses the emerging euro area green bond markets as an empirical case study, using unique and confidential Eurosystem data on bond holdings by euro area investors. It examines whether better information really encourages investors to reallocate capital into green projects across borders. Between 2014 and 2022, these markets were still new, so investors often had to look abroad when green bonds were not yet available at home. Because there were no harmonised rules on, for example, what counted as 'green' or how proceeds should be used, investors likely faced difficulties in obtaining and assessing the information needed to make investment decisions. The dissertation uses this setting to ask whether investors who acquired knowledge about foreign markets continued to use that knowledge once domestic green bond markets emerged. Part I also asks whether firms that

choose to provide voluntary climate-related financial disclosures are better able to attract foreign investors in a market where reliable information is still limited.

The dissertation shows that having more information or prior knowledge does not automatically mean that investors act on it. Investors who acquired knowledge about foreign firms by investing abroad, because no domestic market was available, do not appear to make full use of that knowledge once a home market emerges. Instead, they seem to overinvest in domestic green bonds, to a degree that economic theory would suggest is suboptimal for both investors and firms seeking funding. The dissertation also does not find evidence that firms adopting voluntary ESG disclosures were able to attract structurally more foreign investors to their green bonds.

Part II (Chapter 4) broadens the focus beyond the single market segment of green bonds and examines the broader evidence across EU financial markets. It adopts a systematic literature review and brings together and critically evaluates existing studies on whether voluntary and mandatory ESG disclosures help direct private capital towards green investments and improve funding conditions for these green investments. To do so, Part II compares empirical evidence across different market participants, different types of ESG disclosures and the capital market outcomes of interest. It identifies what is currently known, highlights gaps and limitations in the existing empirical literature and discusses implications for future research and the ongoing policy debate on sustainable finance regulation in the EU.

The review shows that, although the current evidence base is still limited, there are initial signs that high-quality ESG disclosures, whether voluntary or mandatory, are linked to better access to capital and more favourable funding conditions. However, this link may not be the same in all settings, as it depends on differences across countries, including differences in culture and institutions, and firm-specific characteristics. In addition, although only a small number of studies directly examine EU sustainable finance legislation, early evidence suggests that mandatory disclosures may help direct capital towards green investments and improve funding conditions in line with policy objectives. At the same time, the literature points to unintended effects, including complexity, regulatory uncertainty and compliance costs.

Collectively, these results have clear implications for policymakers and regulators. They suggest that the EU sustainable finance framework may help direct capital towards green investment projects, but that its effectiveness depends on ongoing refinement to balance investors' information needs with the need to limit unintended consequences. They also show that better disclosure alone is unlikely to be enough to increase cross-border investment. If deeper capital market integration remains a policy objective, disclosure rules will need to be complemented by other measures, while recognising the limits of what legislation can achieve given investors' persistent preference for domestic markets.

Niet-technische samenvatting

Deze dissertatie verkent of betere openbaarmakingen over milieu, maatschappij en governance (in het Engels *environmental, social and governance*, afgekort ESG) kunnen bijdragen aan een grotere kapitaalstroom naar "groene" projecten en gunstigere financieringsvoorwaarden daarvoor, zowel binnen als tussen lidstaten in de Europese Unie (EU).

De aanleiding hiervoor is het kader voor duurzame financiering dat de EU sinds 2018 heeft ontwikkeld. Dit kader maakt deel uit van de bredere doelstelling van de EU om in 2050 klimaatneutraal te zijn. Dat vraagt om een substantiële aanpassing van de Europese economie. Omdat overheidsmiddelen beperkt zijn, hangt de financiering van deze transitie voor een groot deel af van private investeerders. Om private financiering te ondersteunen, heeft de EU regels ingevoerd die de ESG-informatie van ondernemingen moeten verbeteren. Deze regels zouden investeerders moeten helpen om beter geïnformeerde beslissingen te nemen. Daardoor kan meer kapitaal naar groene investeringen binnen de EU stromen, ook grensoverschrijdend. Ondernemingen zouden zo ook gemakkelijker en tegen gunstigere voorwaarden financiering kunnen aantrekken. Toch is nog onduidelijk of deze regels de beoogde beleidsdoelen daadwerkelijk kunnen realiseren.

Tegen deze achtergrond beoogt deze dissertatie bij te dragen aan de beantwoording van de overkoepelende vraag of ESG-rapportages, zowel vrijwillig als verplicht, belemmeringen in de informatievoorziening voor investeerders kunnen verminderen op een manier die helpt om meer kapitaal naar groene investeringen te laten stromen en de financieringskosten daarvan binnen de EU te verlagen, ook over landsgrenzen heen. De dissertatie compileert drie op zichzelf staande studies, verdeeld over twee delen, om deze vraag te onderzoeken.

Deel I (Hoofdstukken 2 en 3) gebruikt de opkomst van markten voor groene obligaties in het eurogebied als empirische casus. Daarbij wordt gebruik gemaakt van unieke en vertrouwelijke Eurosysteemdata over obligatiebezit. Dit deel onderzoekt of betere ESG-rapportages beleggers ertoe aanzetten om kapitaal grensoverschrijdend te heralloceren aan groene projecten. Tussen 2014 en 2022 stonden de markten voor groene obligaties nog in de kinderschoenen. Veel beleggers weken daarom uit naar het buitenland zolang er in hun eigen land nog geen markt bestond. Omdat er destijds nog geen geharmoniseerde definities waren van wat als "groen" gold, en ook geen kaders voor hoe bedrijven de opbrengsten moesten besteden, was het voor beleggers lastig om relevante informatie te vinden en beoordelen.

Deze dissertatie gebruikt die context om te onderzoeken of beleggers de kennis die zij in het buitenland hebben opgedaan ook blijven benutten zodra er in eigen land een markt voor groene obligaties ontstaat. Deel I onderzoekt daarnaast of bedrijven die vrijwillig klimaatgerelateerde financiële informatie openbaar maken beter in staat zijn om buitenlandse beleggers aan te trekken voor hun groene obligaties in een markt waar betrouwbare informatie schaars is.

De dissertatie laat zien dat meer informatie of eerder opgedane kennis beleggers niet automatisch tot actie aanzet. Beleggers die kennis hebben over buitenlandse bedrijven doordat zij daarin investeerden bij gebrek aan mogelijkheden in eigen land, benutten die kennis niet altijd optimaal zodra er een thuismarkt voor groene obligaties ontstaat. Zij beleggen dan relatief veel in eigen land, zo sterk dat dit volgens economische theorie niet optimaal is voor henzelf en ook niet voor bedrijven die financiering zoeken. Daarnaast vindt deze dissertatie geen bewijs dat bedrijven die vrijwillig klimaatgerelateerde financiële informatie openbaarmaken relatief meer buitenlandse beleggers aantrekken voor hun groene obligaties.

Deel II (Hoofdstuk 4) brengt aan de hand van een systematische literatuurstudie empirisch bewijs samen over de vraag in hoeverre ESG-rapportages, zowel vrijwillig als verplicht, samenhangen met een herallocatie van kapitaal naar groene investeringsprojecten en gunstigere financieringsvoorwaarden daarvoor. Daarbij vergelijkt Deel II bevindingen uit de literatuur voor verschillende marktpartijen, verschillende typen ESG-rapportages en verschillende uitkomsten voor de allocatie en kosten van kapitaal. De dissertatie bundelt zo de huidige stand van kennis, laat zien waar de literatuur nog gaten en beperkingen vertoont, en verkent wat dit betekent voor toekomstig onderzoek en beleid.

De literatuurstudie laat zien dat er, ondanks de nog beperkte empirische basis, eerste aanwijzingen zijn dat ESG-rapportages van hoge kwaliteit, zowel vrijwillig als verplicht, samenhangen met betere toegang tot financiering en gunstigere financieringsvoorwaarden. Die samenhang blijkt niet in alle situaties hetzelfde, maar kan verschillen tussen landen, bijvoorbeeld door cultuur of instituties, en ook tussen bedrijven onderling. Hoewel nog maar weinig studies specifiek kijken naar het Europese kader voor duurzame financiering, laat de literatuur ook daar eerste aanwijzingen zien dat ESG-rapportageregels effect heeft op kapitaalmarkten in de richting van beoogde beleidsdoelen. Tegelijkertijd wijst de literatuur op mogelijke onbedoelde neveneffecten, zoals complexiteit, onzekerheid over regelgeving en nalevingskosten.

Deze bevindingen zijn relevant voor beleidsmakers en regelgevers. Ze wijzen erop dat het Europese kader voor duurzame financiering de groene transitie kan ondersteunen, maar dat de effectiviteit ervan afhangt van bijsturing. Die bijsturing zou een balans moeten vinden tussen de informatiebehoefte van investeerders en het beperken van onbedoelde gevolgen. Als verdere kapitaalmarktintegratie een beleidsdoel blijft, zullen openbaarmakingsregels

daarom moeten worden aangevuld met andere maatregelen. Daarbij moet ook rekening worden gehouden met de grenzen van wat regelgeving kan betekenen.

Curriculum Vitae

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Education

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2009 - 2011	**MSc in Economics**, Radboud Universiteit, *Nijmegen, The Netherlands* MSc Financial Economics (2010-11) - *cum laude* - Thesis grade: 8.5 out of 10. MSc International Economics (2009-10) - *cum laude* - Thesis grade: 8 out of 10.
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