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To What Extent Has ESG Regulation Influenced Corporate Investment in Sustainable Projects?

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ABSTRACT

The growth of Environmental, Social, and Governance (ESG) regulatory frameworks in the major economies around the world in the last ten years has had an effective restructuring effect on the corporate investment decision making. The paper will explore the degree in which the ESG regulation can affect corporate investment in sustainable projects based on evidence in the empirical studies, regulation reports and market trends. The analysis will examine three major regulatory regimes-The European Union Sustainable Finance Disclosure Regulation (SFDR) and Corporate Sustainability Reporting Directive (CSRD), the United States proposal to have mandatory disclosure (Securities and Exchange Commission), and use of green bonds in managing corporate risks in China-and how they have affected the allocation of capital, investment efficiency, and the issuance of green bonds, and corporate risk management. The results indicate that mandatory reporting of ESG disclosures have helped to provide a quantifiable change in the capital flows towards sustainable investments, where the issuance of sustainable bonds with a global scope has reached about USD 1.1 trillion in 2024. Nevertheless, the degree of such an effect depends on the institutional settings and depends on factors like regulatory rigidity, the level of ESG maturity and the occurrence of greenwashing risks. Based on the Resource-Based View, Stakeholder Theory, and the mediation theory of Kharuddin et al. (2025) the paper states that ESG regulation does not only play the role of a compliance issue but as a construction mechanism that will promote the efficiency of investments and the creation of corporate value in the long term.

Keywords: ESG regulation, sustainable investment, green bonds, corporate value, investment efficiency, SFDR, CSRD, ESG maturity

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1. Introduction

Identifying as one of the most impactful consequences on the corporate strategy and investment behaviour of the twenty-first century, Environmental, Social, and Governance (ESG) considerations have been unleashed. What started as a voluntary framework of non-financial principles as advocated by institutional investors and civil society groups has increasingly become a solid and enforceable regulatory framework that cuts across several jurisdictions. Governments, regulatory regimes, and supranational regimes have implemented mandatory disclosure policies, sustainability taxonomies, and reporting standards, all aimed at refocusing the private capital on sustainable economic operations, and in order to hold the corporations to account on their environmental and social footprints.

This change has spawned a lot of scholarly and political debate. Advocates contend that strong ESG regulation decreases information asymmetry, eases the costs of sustainable capital, as well as triggers the long-term investment in clean energy, green infrastructure, and socially responsible investments (Daugaard and Ding, 2022). Opponents, nevertheless, note a regulatory burden, the threat of greenwashing, and inconsistencies in definition and, in some areas of the United States, an accelerating political backlash that could be eroding the effectiveness of the ESG-related mandates (Harvard Law School Forum on Corporate Governance, 2024).

Having a leading question to the paper: to what extent has ESG regulation impacted corporate investment in sustainable projects, the question is therefore timely and intricate. The total cumulative amount of green and sustainable bonds issued by the global green and sustainable bond market is USD 6.2 trillion and the annual issuance is USD 1.1 trillion, which is a 5% growth compared to 2023 (World Bank, 2025). The assets of sustainable funds worldwide topped some USD 3 trillion in 2023, with almost 85 percent coming out of Europe (Pheonix Research, 2024). In the meantime, a survey provided by Deloitte and Tufts University discovered a notable increase in sustainable investment policies of investors worldwide (79%), which exceeds other years (ESG Today, 2024). These figures are indicative of a structural change, although the extent to which regulatory requirements - rather than market forces or voluntary commitments - contribute to such a change must be carefully evaluated.

2. The Global ESG Regulatory Landscape

2.1 The European Union: Pioneer of Mandatory ESG Regulation

Regulatory ESG has been most systematic and prolifically designed by the European Union on a global basis. The approach developed by EU is reflected in three overlapping frameworks such as: the EU Taxonomy Regulation, the Sustainable Finance Disclosure Regulation (SFDR) as well as the Corporate Sustainability Reporting Directive (CSRD). The combination of these tools

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constitutes what the EU calls the Sustainable Finance Framework, developed as a feature of the European Green Deal to attract the flows of private capital to climate-neutral and sustainable economic practices (Envoria, 2024).

Entering into force in March of 2021, the SFDR will compel the financial market actors to report on the manner in which they incorporate ESG risks and sustainability preferences into their investment procedures. Within this classification, money can be categorized as Article 6 (no sustainability claim), Article 8 (promoting environmental or social characteristics), or Article 9 (targeting sustainable investment outcomes) (Morningstar, 2024). Article 8 funds beckon around half of the total EU fund assets, raising EUR 38 billion of new money during the first nine months of 2024 - the largest inflows since late 2022 (Morningstar, 2024). Reclassification requirements of the SFDR has forced asset managers to make sure that sustainability claims are made true, and that they directly impact on portfolio construction and investment decisions.

In November 2022, and effective in January 2023, the CSRD is perhaps the most ambitious corporate sustainability reporting requirement of all time. It increases the number of companies subject to the requirements of mandatory sustainability reporting to an approximate of 50,000 companies in addition to 11,700 firms covered by the previous Non-Financial Reporting Directive (NFRD) (Greenomy, 2024). Businesses are obliged to publish under the European Sustainability Reporting Standards (ESRS), which comprises about 1, 200 data points with respect to the environmental, societal and governance aspects. More importantly, the CSRD presents the notion of the so-called double materiality, as companies are now expected to report, not just on how the sustainability-related problems impact the business, but on how their operations influence the environment and society (Envoria, 2024). This two-way disclosure requirement essentially flips the axis of how organisations have to do and report about the sustainability of their investments.

2.2 The United States: A Divided Regulatory Environment

Unlike the unified regulatory framework in Europe, the United States boasts of a disjointed and politically divisive ESG regulatory landscape. On the federal level, in 2022, the Securities and Exchange Commission (SEC) suggested climate-related disclosure regulations, by which it is hoped that public companies would need to report material climate risks and greenhouse gas emissions. In December 2023, the Names Rule Amendment of SEC became effective, which means that funds which have names based on ESG terms must set at least 80 percent of assets in ESG-related strategies (Harvard Law School Forum, 2024). This regulation made a direct impact on the design of fund products and portfolio.

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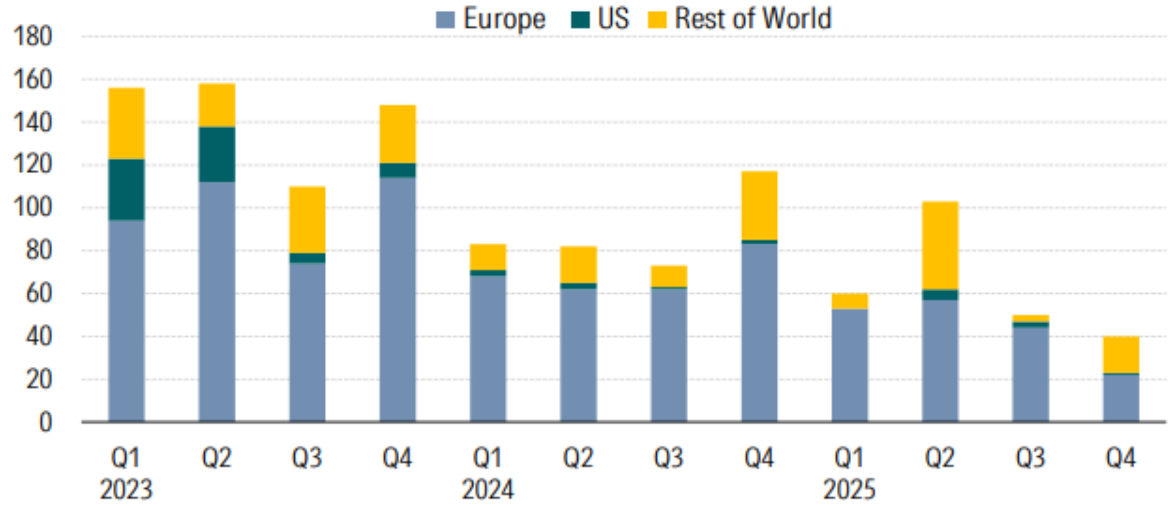
Nevertheless, the political opposition to the regulatory path in the United States is very complicated. As of the end of 2023, more than 150 anti-ESG bills and resolutions were proposed in 37 states, and at least 40 anti-ESG laws had come into effect in 18 states (Harvard Law School Forum, 2024). This reversal helped cause a market cooling: On January 1, 2023, U.S. sustainable funds registered their initial calendar year of net outflows since Morningstar was tracked to track the information. In 2024, the net outflows of U.S. ESG funds were more than USD 13 billion in the first half of 2024 (Harvard Law School Forum, 2024). On a state level, California has been an exception, and laws like SB 253 and SB 261 have mandated large employers within the state to disclose Scope 1, 2 and 3 greenhouse gas emissions and climate-induced financial risks.

Exhibit 4 Global Sustainable Fund Launches Per Quarter



Morningstar.(2026). Global sustainable fund flows: Q4 2025 in review. *Retrieved from* *https://www.morningstar.com/lp/global-esg-flows*

According to this chart, the assets of ESG funds have increased since 2018 when it was approximately $600 billion to 2025 when the figure was approximately 3.9 trillion, and it signifies a change in the nature of investments. This has been greatly linked to regulatory assistance and rising ESG disclosures.

2.3 China: State-Directed Green Finance

The China case is a unique example of a state-based ESG regulation, which is established as a part of overall objectives of ecological civilisation and carbon peaking and neutrality. An early regulatory integration of ESG concerned lending by China in the 2012 Green Credit Guidelines, which stipulated that banks should consider environmental and social conditions in lending to

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high-polluting industries. An experimental study of the effect of the policy as a quasi-natural experiment was statistically significant with a mean improvement of 2.3-3.7 points in Bloomberg ESG score on the environmental performance of targeted firms (equivalent to a reduction of 1.2 - 1.8 million tons of SO 2 emissions per year). China also appeared to be the biggest emerging market issuer of green, social, sustainability and sustainability-linked bonds or the GSSS. Around USD 800 billion of GSSS bonds are already issued in emerging markets between 2018-2024, all of which are green bonds (two-thirds) (IFC, 2024).

The compulsory ESG reporting policies of Chinese listed companies in the Shenzhen and Shanghai stock markets, and the inclusion of ESG measures in state-owned procurement, taxation policies and financial services also demonstrate how regulatory design influences corporate investment behaviour in state-oriented economies (ScienceDirect, 2024). Kharuddin et al. (2025) specifically study Chinese listed companies, where they identify a positive and significant impact of the ESG performance on corporate value (= 0.45, = 6.23, = 0.000 - the positive mediating effect) and find that investment efficiency and risk management efficiency are important channels of mediation - a result that directly links to the institutional and regulatory environment in which the Chinese firms

2.4 International Convergence: ISSB and International Standards.

One significant change in 2023 was the release of the international standards of sustainability reporting, the International Sustainability Standards Board (ISSB), a new body to replace the Sustainable Accounting Standards Board (SASB) and the Task Force on Climate-Related Financial Disclosures (TCFD), in various aspects. The IFRS S1 and S2 standards promoted by the ISSB and supported by several key economies, such as Australia, UK, and Singapore, are a way towards international harmonisation of reporting on sustainability. In India, the Securities and Exchange Board are also starting to request leading entities to report ESG-related activities, and the CSRD in the EU is built to be compatible with ISSB standards (ESG Today, 2024). The result of this convergence is decreased fragmentation and a closer similarity of more decision-useful data to investors looking at sustainable projects across geographies.

3. Theoretical Framework

There are three theoretical frameworks that are of special interest in explaining the effects of the ESG regulation on corporate investment in sustainable projects.

Also called the Stakeholder Theory (Freeman, 1984), when applied in the context of ESG, the theory suggests that the companies that can generate value to a variety of stakeholder groups, or employees, customers, investors, communities, and regulators, will be more likely to sustain financial performance in the long term. ESG regulation transforms demands on sustainability

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transparency by the stakeholders into a formalism that thus makes the previously voluntary requirements mandatory and enforceable. Kharuddin et al. (2025) clearly apply Stakeholder Theory by stating that higher ESG levels will result in higher corporate value by improving a company reputation and gaining investor trust, which will others make it easier to get capital to invest in sustainable projects.

An alternate lens is the Resource-Based View (Barney, 1991). Companies who build premium ESG capacities - methodical risk management, capital investment based on sustainability, and unified reporting systems - have strategic assets that are precious, imponderable, and are embedded within organisations. This is operationalised by Kharuddin et al. (2025) in the construct of ESG maturity that mediates between ESG performance and investment efficiency ($\beta = 0.42$, $t = 4.99$, $p = 0.000$). Companies with greater ESG maturity will be in a better position to turn compliance with the regulations into a competitive edge and thus invest in projects that will yield sustainability and financial success.

The third framework is Porters Hypothesis (Porter and van der Linde, 1995): excellent environmental regulation spurs innovation which enhances corporate competitiveness and does not merely result in increasing costs. In ESG terms, this means that compulsory disclosure policies and sustainability practices can motivate the companies towards developing clean technology, energy efficiency, as well as sustainable supply chains. This hypothesis has empirical evidence in an ESG context, with some studies discovering that ESG policy will largely spur green technology innovation in a business, and increasing regulatory strength will enhance the positive association between ESG practices and efficiency in investments (ScienceDirect, 2025).

Combined, these three frameworks imply that ESG regulation is not merely a cost to the firms but fundamentally restructures the investments calculus with better resource allocation, lower risk exposure and better stakeholder relationship serving as the means to align sustainability commitments with long-term financial value.

4. Empirical Evidence: How ESG Regulation Has Influenced Corporate Investment

4.1 The Growth of Clean Energy Investment

The clearest impact that ESG regulation has on investment is the rapid pace in clean energy investments all over the world. Below chart shows how the global capital flows have shifted the structure towards clean energy investment since 2015 and in comparison with the fossil fuel investment.

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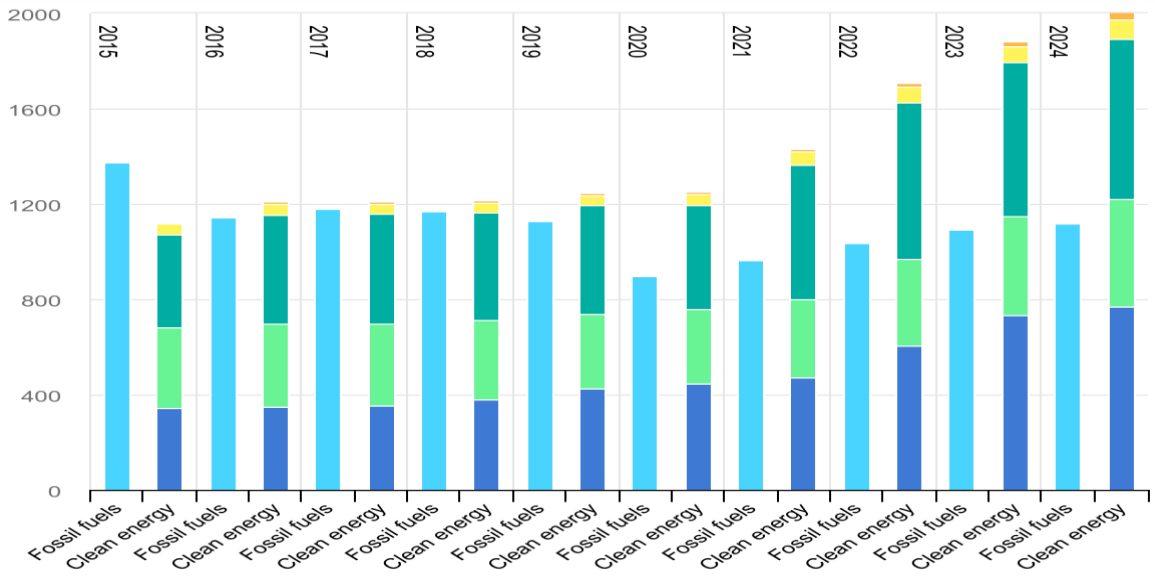

International Energy Agency (IEA), World Energy Investment 2024 — https://www.iea.org/reports/world-energy-investment-2024/overview-and-key-findings

This is an estimated value in the IEA, World Energy Investment 2024 flagship report that contrasts global investment in clean energy technologies (including renewables, EVs, grid and storage, and efficiency, nuclear and low-emissions fuels) per year with that in fossil fuel investments between 2015 and 2024. It visually shows the crossover point in 2023 - the first time on record that combined renewable power and grid investment exceeded fossil fuel spending - and the expanding gap in 2024 as clean energy receives about USD 2 trillion compared to around USD 1 trillion of fossil fuels.

- The estimated clean energy investment reached almost USD 2 trillion in 2024 - approximately two times the amount of fossil fuel investment (approximately USD 1 trillion) (IEA, 2024a).
- In 2024, China alone spent USD 675 billion on clean energy, equivalent to about 1/3 of the world expenditure on clean energy.
- In 2024, the EU spent USD 370 billion and the United States more than USD 300 billion on clean energy, which is 1.6 times as much as in 2020.
- The total solar PV investment was higher than all other sources of generation taken together in 2024 at USD 500 billion.

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The rate of growth of clean energy investment was only 2% per year in the five years after the Paris Agreement (20152020), but increased to 12% per year since 2020, fuelled by regulatory incentives such as the US Inflation Reduction Act, EU Green Deal and national green finance programmes (IEA, 2022).

4.2 Redirecting Capital Flows: The Growth of Sustainable Finance Markets

The most apparent impact of ESG regulation on corporate investment is its huge expansion of sustainable finance market. In 2024 global issues: The issuance of sustainable bonds in the world increased by 5 percent to USD 1.1 trillion, reaching a cumulative amount of USD 6.2 trillion by December 2024 (World Bank, 2025). The preponderant activity in this market was green bonds, which accounted 57% of yearly issues in 2024. The issuance of corporate green bonds by non-financial companies remarkably increased by 20% in 2024, as the corporate interest in sustainability-linked financing was becoming increasingly evident (OECD, 2025).

The regulation development has a close relationship with this growth. In 2023, with the adoption of the EU Green Bond Standard, new transparency and accountability requirements were developed that bond issuers must meet, with bond proceeds directly connected to EU Taxonomy-in line activities. The global green bonds market will have reached USD 582.6 billion as of 2023 and USD 1,555.1 billion as of 2033, with a compound annual growth rate of (CAGR) of 10.1% (Allied Market Research, 2024). The issuance of green bonds grew 34% annually in the year 2023 in in-flight markets alone; USD 135 billion, in 2023 (IFC, 2024).

The issuer side is reflected in the investor side. According to a survey of more than 1,000 institutional investors conducted by Deloitte/Tufts University, 79% of investors had formal sustainable investment policies at the time of the survey (2024) with 79% saying that their regulatory requirements were a driving force in their decision, as well as better performance expectations and the ability to attract talent (ESG Today, 2024). Moreover, 83 per cent of investors more often or once in a while consider sustainability data in underlying investment analysis. According to a 2023 study by Capital Group, 4 in 10 investors are doing proprietary ESG analysis and scoring (up 40%), and 37 in 10 are expanding in-house ESG knowledge (CleanHub, 2024). Such investor behaviour changes directly affect the decisions taken by corporations concerning their investment through the pursuit of ESG aligned capital at low-cost levels.

4.3 Investment Efficiency: Disclosure to Capital Allocation

In addition to aggregate capital flow indicators, ESG regulation proved to enhance the quality of corporate investment decision-making - what Kharuddin et al. (2025) call the quality of investment efficiency. The authors state that an efficiency in investments is the capacity of an

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organisation to invest capital to achieve long-term goals to maximise return opportunities (Aluchna et al., 2023), and show that investment efficiency mediates the relationship between ESG performance and corporate value (= 0.34, t = 5.23, p = 0.000). Their R-Squared indicates that the ESG related predictors explain 57 percent of the difference amongst the 300 Chinese listed companies about investment efficiency - a medium to strong predictors that indicate the central position of the ESG factor in investment planning.

This effect is magnified by mandatory ESG reporting, which minimizes information asymmetries which cause capital to be misallocated. Once companies need to report their environmental risks, sustainability plans, and their capital spending that is environmentally related, both investors and inside decision makers can have a better idea of where capital is being invested in productively. According to Daugaard and Ding (2022), companies that exhibit a well-established ESG management attract more patient capital, lower financing costs, and have a disciplined resource distribution. This link is further operationalised under the CSRD requirement that firms need to disclose turnover, capital and operational expenses based on the objectives of the EU Taxonomy whereby firms are obliged to formally evaluate and report the sustainability footprint of any major investment decision.

A key empirical example is a study of Chinese energy firms with the period 2010-2024 that established good results that higher ESG practices have a significant and positive relationship with better investment efficiency (ScienceDirect, 2025). Most importantly, according to the study, the strength of regulatory enforcement is an important moderating factor and it increases the value of ESG practices in terms of perceived risk reduction and social reputation reinforcement. This substantiates the hypothesis that, ESG regulation does not only influence corporate desire to invest in a sustainable manner but it also substantially increases the efficiency of making that investment.

4.4 Risk Management Efficiency: Regulation as a Risk Governance Driver

The ESG regulation has also pushed firms to open up their risk management frameworks in such a manner that will shift investments over more sustainable long-lasting projects. A second important mediator of ESG performance and corporate value, according to Kharuddin et al. (2025), is the risk management efficiency ($\beta = 0.28$, t = 4.82, p = 0.000). Moreover, they also discover an important serial mediation: ESG performance increases risk management efficiency, which increases investment efficiency, which increases corporate value (0.38, t = 6.05, p = 0.000). This chronological sequence implies a logical inner process according to which the regulation of ESG produces tangible investment results.

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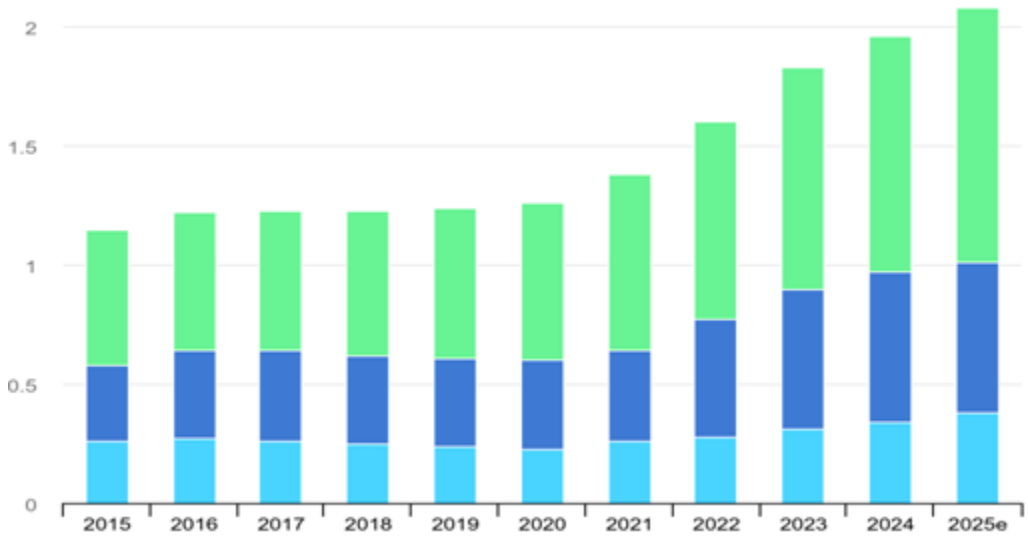
The CSRD and TCFD-compliant mandatory disclosure obligations also stipulate that companies identify material climate and sustainability risks - regulatory, physical and transitional - and disclose them. This rigorous risk analysis exercise forces companies to reintegrate the externalised environmental expenses previously and this re-investment is not in high-risk and carbon-prone projects but in alternative projects that are more sustainable. According to the PwC Global Investor Survey 2023, the most important matters among investors were ESG outcomes and regulatory risks, and 8 out of ten investors inspect ESG report to examine the impact of sustainability issues on cash flows (CleanHub, 2024). In circumstances or, when corporate ESG disclosures are credible and complete, they enable investors to better recognize and price the ESG-related risks, reducing the cost of capital of firms with good sustainability practices.

4.5 Investment in Green Innovation and Clean Technology

The issue of ESG regulation has also affected corporate investment by catalyzing green innovation - a significant platform that may bridge between disclosure requirements and the real project-based sustainability investment. In line with Porters Hypothesis, empirical studies have identified in various jurisdictions that policy safety nets of ESGs and environmental laws provide innovation incentives that can result in more and better green innovations (Frontiers in Energy Research, 2024). An examination of new energy companies in China identified that corporate ESG is substantially and positively correlated to clean technology innovation, where the association augmented as companies are in sectors where ESG scrutiny is more eminent.



International Energy Agency. (2025). Global clean energy investment by income group, 2015–2024. *Retrieved from* https://www.iea.org

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The chart shows that the investments in clean energy of the whole world have been steadily increasing since 20152024 and are now starting to be concentrated on more sustainable areas. This is to validate the fact that ESG regulation is part of real economic investment than financial flows.

On a macro-level, investments in clean energy have been predicted to amount to around USD 1.7 trillion in 2023 around the world - which includes renewable energy, electric vehicles, energy efficiency, and grid infrastructure (Harvard Law School Forum, 2024). Although not every aspect of this investment can be accredited straight to ESG regulation, in particular, the regulatory environment, such as the green taxonomy guidelines, compulsory ESG reporting, sustainability-linked lending terms, and the green bond principles have played a pivotal facilitating role. It is exactly to locate and analyze investment opportunities within these regulated, expanding clean-economy business areas that asset managers are now taking on proprietary ESG analysis and are in-sourcing sustainability expertise.

5. ESG Maturity as a Moderating Condition

Among the most subtle descriptions made in the literature is the moderating effect of the maturity of ESG - how deep the ESG principles are entrenched within the governance systems, decision-making mechanisms, and operating culture in an organisation. This notion is important since it aids in the understanding of why the ESG regulation yields different investment performances amid firms and industries, although they encounter the same regulatory demands.

Kharuddin et al. (2025) support ESG maturity as a variable in their sample of Chinese listed companies, where the mean score of operationalising it is 3.90 out of 5.00; and finds that it has two key moderating effects. To begin with, the level of ESG maturity supports the positive correlation between ESG performance and investment efficiency ($\beta = 0.42$, $t = 4.99$, $p = 0.000$) which means that companies with well-developed ESG systems are better placed to turn the ESG compliance into the provision of investment choices that are strategic. Second, investment efficiency contributes more to corporate value in well-governed ESG firms ($\beta = 0.36$, $t = 5.25$, $p = 0.000$) compared to its contribution in less mature firms, indicating that better-managed ESG firms gain higher financial returns through their sustainability investment.

These results can be directly applied to grasp the efficacy of ESG regulation. The regulatory requirements of disclosure and the need to integrate sustainability will deliver greater investment performance among companies that have truly institutionally embedded ESG (where resource-allocation models and corporate culture are based on sustainability implications) than those that have done so only to a nominal task (sustainability compliance). This substantive large-scale, versus strategic adoption of ESG reflects the larger discussions on the circumstances in which

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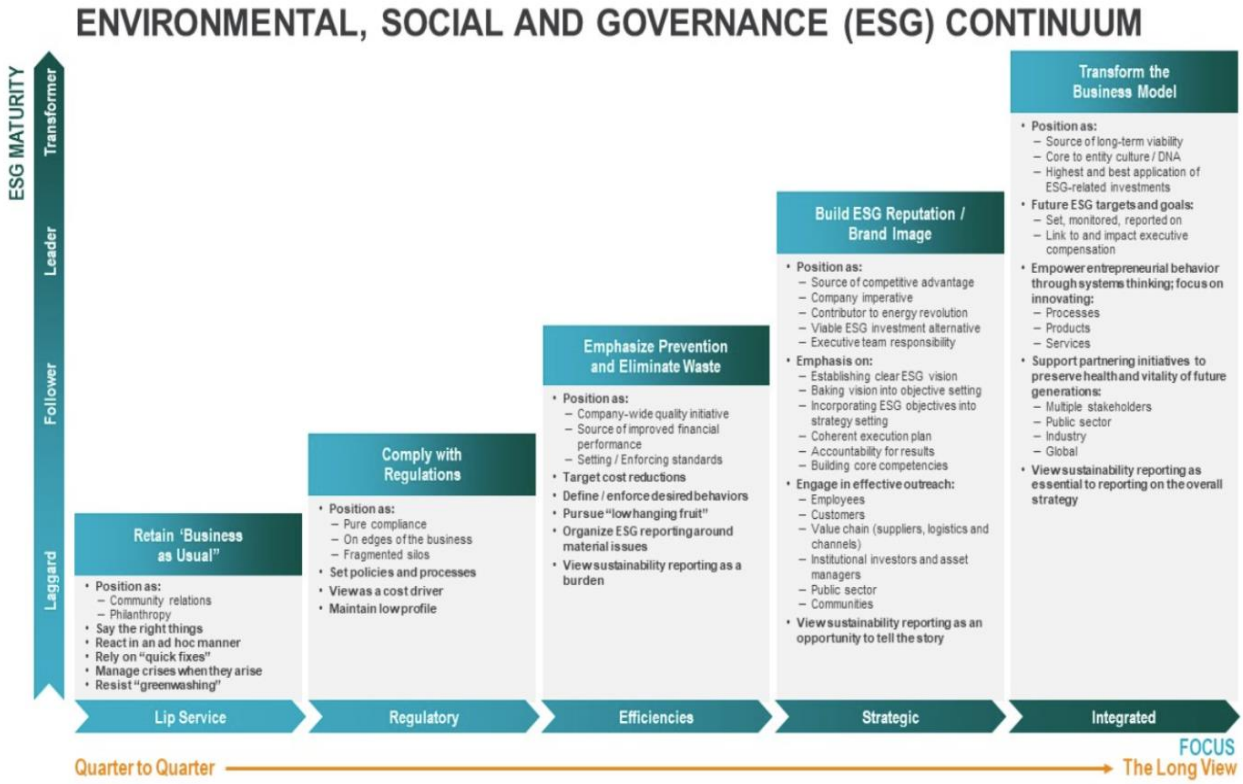
environmental regulation can generate innovation beyond compliance (Frontiers in Energy Research, 2024).



Protiviti. (2023). Where is your company on the ESG reporting continuum? The Protiviti View. https://blog.protiviti.com/where-is-your-company-on-the-esg-reporting-continuum

Above graph illustrates a linear four-stages corporate ESG maturity spectrum, starting with Lip Service/ philanthropy (the weakest position, risk of greenwashing and reputational exposure), through Regulatory Compliance (cost follower position), and Efficiencies (cost-reduction and operational optimization orientation), to overall Strategic Integration (where ESG contributes to competitive positioning and long-term value creation). The corresponding graphic visually supports the point that compliance merely with regulatory requirements is a minimum state of affairs - companies should move the stage towards strategic ESG incorporation as the only means of achieving the maximum benefits of investment efficiencies and corporate values. It directly aligns with the ESG maturity framework empirically tested by Kharuddin et al. (2025) where the higher the ESG maturity, the stronger the association is between ESG performance and investment efficiency ($\beta = 0.42$, $p < 0.001$) and corporate value ($\beta = 0.36$, $p < 0.001$).

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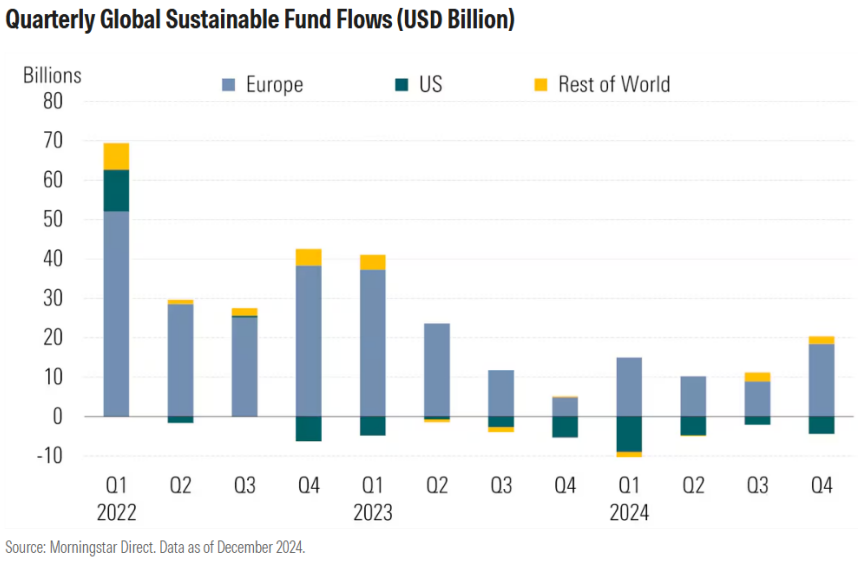
The cross-country regulatory effectiveness overlaps with would existence of ESG maturity. The more developed regulatory framework, greater history of voluntary ESG practices and a more developed investor ESG ecosystem has made the average level of ESG maturity of European firms quite high in comparison to most other regions. Around 83% of net assets of global ESG funds are under the control of Europe (CleanHub, 2024; Pheonix Research, 2024), and companies based in the EU have been driven to build more advanced ESG capabilities by wave upon wave of regulations. Conversely, those areas that have yet to have ESG regulation or are undergoing regulation disputes tend to have lower average levels of ESG maturity, which could dampen the investment efficiency returns observed in more established regulatory settings.

6. Synthesis: The Regulatory-Investment Nexus in Evidence

6.1 Quantifying Regulatory Impact

The evidences examined in Sections 4 and 5 show that the regulation of ESG has had a significant - though non-uniform - impact on corporate investment in sustainable projects. There are a few quantitative indicators. The amount of funds in sustainable funds managed worldwide topped about USD 3 trillion in 2023 (Pheonix Research, 2024), with funds based in EU taking up 83% of the figure. The most prominent reason why Europe has a disproportionate portion of ESG assets is its regulatory ecosystem - the SFDR, CSRD and EU Taxonomy. In the interim, the regulation of Europe also directly explained the EUR 38 billion net inflows into Article 8 funds within the first nine months of 2024, the most since the end of 2022 (Morningstar, 2024).



Morningstar. (2025). Global ESG fund flows increase in Q4. *Retrieved from* *https://www.morningstar.com/sustainable-investing/global-esg-fund-flows-increase-q4*

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This chart, based on the global distribution of ESG assets, indicates that Europe has the majority of ESG assets (about 80 85 percent), which is many times higher than the US and other markets. This contributes to the claim that robust regulatory frameworks (SFDR, CSRD) can have a substantial impact on the capital flow towards sustainable investments.

On a corporate level, the requirement of the CSRD that demands the corporate map and disclosure of the sustainability impact of conditions of capital expenditures is likely to require the companies to map the sustainability impact of their capital expenditures formally. The CSRD by expanding mandatory sustainability reporting to approximately 50,000 companies around the world (Greenomy, 2024) aims at successfully establishing a structural compulsion towards companies to evaluate and explain investment decisions in terms of sustainability. The immediate financial upshot of disobedience - such as fines by regulators, loss of reputation, and the loss of access to the capital market - makes the investment drive even more acute.

The prototype of Green Credit Guidelines in China has achieved significant results: a statistically significant 2.33-3.68 points improvement in Bloomberg ESG scores of the environment in targeted firms, which translates into decreases in annual SO 2 emissions of 1.2-1.8 million tons (Nature, 2025). This indicator of regulatory performance in a state-managed economy highlights the importance of the fact that the mechanism linking ESG regulation with investment returns does exist in a variety of institutional environments, albeit with varying pathways.

6.2 Regulatory Pathways to Investment Change

According to the evidence, there are four different pathways to ESG regulation affecting corporate investment in sustainable projects:

(i) Sustainability investment screen through mandatory disclosure: Regulatory frameworks force companies to disclose their sustainability practices and in doing so, help investors compare and assess the corporate sustainability commitments through the creation of a standardised information architecture. This minimizes information asymmetries and helps price better ESG-related risks and opportunities, allocating capital to those firms with credible sustainable investment pipelines.

(ii) Investment regulatory taxonomies Regulatory taxonomies Regulatory taxonomies in form of investment guidelines The EU Taxonomy and similar national green finance taxonomies provide a clear map of where regulatory recognition - and follow-up access to more affordable green capital - may be accessed by a company or investor. This classification has a direct impact on corporate investment portfolio.

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(iii) Risk internalisation through disclosure: Forced reporting of climate-related risks (physical, regulatory, and transitional) makes firms formally evaluate and internalise the sustainability risks involved in their asset portfolios. This internalisation of risk, automatically shifts investment off stranded or high risk assets and towards more sustainable investments.

(iv) Capital market signalling and green premiums: Regulation frameworks that certify or label sustainable investments - such as SFDR Article 8/9 classifications, and the EU Green Bond Standard generate market signals that investors use to define and allocate capital to sustainability-aligned firms. Firms, which adhere to such frameworks, are allowed to secure capital at a reduced cost (a greenium), which would develop a direct financial incentive to invest in qualifying green sustainable projects. The first example was the Dominican Republic in 2024, where the first green bond was sold off at a price that was about 15 basis points lower than the same conventional bonds, and the order book was oversubscribed six times (World Bank, 2024).

7. Limitations, Counterarguments, and Emerging Challenges

7.1 Greenwashing and Regulatory Credibility

One of the more dire shortcomings of current ESG regulatory regimes is the danger of greenwashing - i.e. making claims about sustainability, without making material changes to their investment behaviour. In a survey conducted by PwC Global Investor Survey 2023, it was revealed that a good 87 percent of investors thought the corporate ESG disclosures included some amount of greenwashing (CleanHub, 2024). Efforts by regulators to help control this - such as the anti-greenwashing rules of the EU, the Names Rule Amendment at the SEC and the ESMA guidelines on fund names labels - are both needed, still developing. The connection to the effective outcomes of sustainable investments with disclosure requirements will be distorted until regulatory enforcement mechanisms are robust enough.

Another associated problem is the so-called greenhushing: with the rise of ESG obligations into the field of regulatory and political attention, part of the companies is increasingly intentionally minimizing or obscuring their sustainability goals to avoid criticism. According to a worldwide study, up to a quarter of sustainability-intent companies reportedly fail to disclose their climate targets, which appear to be science-based (Harvard Law School Forum, 2024). This practice diminishes the availability of information to the investors and it could compromise the regulatory goals although businesses are still trying to achieve their own sustainable investment goals privately.

7.2 The US Anti-ESG Backlash and Market Fragmentation

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The rising political contestation of ESG in the United States is a structural challenge of effective regulatory action. The US regulatory environment has become a drag on the momentum of ESG investment in the largest global financial market with more than 40 anti-ESG laws in force in 18 U.S. states as of late 2023 (Harvard Law School Forum, 2024), and net outflows in U.S. sustainable funds surpassing USD 13 billion in the first half of 2024. By 2023, Morningstar had about 2,500 fewer sustainable funds worldwide than in the previous year (Harvard Law School Forum, 2024), in part due to the closure or renaming of funds due to regulatory pressures and changes in investor sentiment.

This disaggregation of the wide-ranging regulatory impetus in the EU and the US retrenchment give regulatory arbitrage and can act as a drag on global convergence to reach the scale of sustainable investment needed to meet climate goals. This is emphasized by the fact that the results of Kharuddin et al. (2025) are particular to the Chinese institutional context - and is unlikely to be relevant to other regulatory contexts.

7.3 Data Quality, Standardisation, and Measurement Challenges

The second issue that has remained as the bottleneck to the successful implementation of ESG regulation as an investment driver is inability to compare and contrast ESG data. Although the different versions of assessment of the same company vary widely, the ESG ratings by different providers even after successive rounds of standardisation. According to a survey conducted by Deloitte/Tufts, in-house proprietary data systems and audited corporate disclosures are the most trusted sources of ESG data by investors (ESG Today, 2024), which indicates that third-party ratings have not been reliable enough to promote investment-wide decision-making. Global standards of the ISSB and EU ESRS are major steps in the direction of comparability, and still full convergence is a midterm goal more than a reality.

8. Conclusion and Policy Implications

The paper has discussed to what degree, ESG regulation has affected corporate investment in sustainable projects and based on the overview of empirical research, corporate data, research on regulatory policies and the concept of mediation/moderation framework developed by Kharuddin et al. (2025). The empirical evidence collected here can be broadly interpreted as a positive though contingent finding: ESG regulation has been an important catalyst of sustainable investment, although its success is mitigated by regulatory structure, institutional environment, ESG maturity and the ongoing greenwashing and data quality issues.

A number of findings headlines are obtained. The cumulative size of the global sustainable bond market has risen to USD 6.2 trillion by December 2024, regulation - especially the inter-locking SFDR, CSRD and the Green Bond Standard of the EU - have been the major causational factor

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in leading to European sustainable finance leadership, with the EU having 83% of the world wide ESG fund net assets. Mandatory disclosure at the corporate level has also increased efficiency in investment by reducing information asymmetries, risk internalisation, and through regulation taxonomies that direct capital allocation into sustainable activities. The empirical findings by Kharuddin et al. (2025) indicate these effects in a Chinese business setting in the form of direct improvements in corporate value (800) and through the mediation of ESG performance on corporate value via investment efficiency (800) and risk management efficiency (800).

ESG maturity is found to be an essential moderating environment variable and enhances the effectiveness of investment efficiency and corporate value of ESG regulation. Companies with institutionalised ESG across their governance, culture, and operations are more likely to transform regulatory requirements into actual competitive advantages - finding and getting capital on more affordable terms, appealing to long-horizon institutional investors, and green innovation. This point has a practical value: regulators ought to structure systems to not merely require disclosure but positively act to promote the increasing maturity of ESG e.g. by providing tiered compliance requirements, regulatory rewards to firms that have demonstrated ESG capability and capacity building assistance to firms at earlier stages of maturity.

To corporate leaders, the findings presented in the paper emphasize that an approach where the implementation of ESG regulation is set as a compliance cost burden, and not a strategic opportunity is most likely not to be an optimal reaction. Those firms that enjoy the most sustainable investment benefit in the regulatory environment are those that actively implement the ESG into their capital allocation structures, sustainability reporting as a strategic alignment instrument, and/or the ability to integrate the ESG capabilities that enable them to get access to the expanding amount of sustainability-linked capital at reasonable rates.

To policymakers, the divergent successes in the EU, the United States, and China imply that policies need to be coherent, consistent, and enforced, to ensure effectiveness. Splintered or disputed regulatory enjoys - like the one now dominant in the United States - dampen the investment signal and cause uncertainty deterring long-horizon sustainable investment. A stronger international regulatory effort such as the global standards of the ISSB would be needed to appropriately redirect the scale of supply of private capital towards sustainable projects as demanded by the climate science.

Further studies are needed to resolve such causal shortcomings of cross-sectional designs, to scale up the analysis to longitudinal and multi-country contexts, and to learn more about sector-specific dynamics. The relationship between ESG regulation and macroeconomic factors - such

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as interest rates, geopolitical shocks, commodities cycles, etc. - driving sustainable investment flows are also worth future research questions.

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