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**Determinants of Green Investment in the European Private
Sector: A Regression-Based Analysis of European Company Data**

Author: Jacob Hinz

Tutor: Peter Guenther Antoon Claeys

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Abstract

This thesis investigates the firm-level determinants of green investment in the European private sector, using data from the European Investment Bank Investment Survey (EIBIS) covering a weighted sample of 20,726 firms across all 27 EU Member States. Applying a multivariate logistic regression model with country, sector, and size fixed effects, the study tests five hypotheses derived from the Pecking Order Theory, the Porter Hypothesis, the Twin Transition framework, and the Managerial Perception literature. The central finding is that green investment is predominantly driven by strategic and behavioral factors on the one hand, and that financial factors like profitability and the share of external financing are insignificant or less relevant determinants of green investment on the other. Managerial perception of the green transition as a business opportunity is the strongest predictor, raising the probability of green investment by 12.2 percentage points. Digital implementation is the second strongest driver, increasing the probability by 9.12 percentage points, confirming a robust Twin Transition complementarity effect. External financing plays a statistically significant but economically modest enabling role. Challenging the slack resource theory, profitability is statistically insignificant as a determinant for green investment. A hypothesis on public policy support is theoretically derived but cannot be tested due to data constraints. The findings have direct implications for EU industrial policy, suggesting that financial de-risking instruments alone are insufficient and that efforts to shift managerial mindsets and integrate digital and green support programs are crucial to accelerating the private sector's environmental transition.

Keywords: green investment, twin transition, logistic regression, managerial perception, EIBIS, SMEs, European Union

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1. Introduction

1.1 Research Background and Motivation

The transition to a net-zero economy represents the defining structural challenge of the 21st century for the global community. Under the European Green Deal, the EU has committed to reducing net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels, with the ultimate objective of achieving climate neutrality by 2050. Even though public policy provided the regulatory framework and initial capital injections needed to kick off this transformation, an estimated €477 billion in additional green investment is required annually to achieve this goal (European Central Bank, 2025). Given the limitations of public finance, the success of the European climate agenda is impossible without mobilizing capital from the private sector.

However, corporate green investment is not a frictionless process. Unlike conventional capital expenditure, environmental projects are often characterized by “double externalities”, with firms bearing the full private costs of abatement even though the environmental benefits are shared by society (Rennings, 1998). Furthermore, firms today must navigate the “Twin Transition”; the simultaneous pursuit of digital and environmental capabilities adds a layer of strategic complexity to an already highly ambiguous economic environment.

Despite the urgency, the corporate sector is divided in its approach to climate change: some firms aggressively decarbonize, others remain inert. Standard economic theory, specifically the “Slack Resources Theory” (Bourgeois, 1981), suggests that profitable, cash-rich firms should be the primary drivers of this investment. Yet the corporate sector remains divided in its approach, with many financially robust firms remaining inert while other resource-constrained firms innovate sustainably (Kalantzis, 2023). Traditional financial metrics alone cannot explain this discrepancy. Also, the role of behavioral factors and decision makers’ perception of climate transition is often absent in both empirical research and climate policy.

1.2 Research Objectives and Contribution

This thesis seeks to close these gaps by analyzing green investment not as a purely financial calculation, but as a strategic outcome shaped by the interplay of financial constraints, technological capabilities, and managerial perception. Specifically, it challenges the assumption of “financial determinism” by introducing behavioral and digital variables into

the econometric framework. To address these theoretical and empirical ambiguities, the following research questions established the core of this thesis:

"What firm-level and financial factors influence green investments in European private sector companies?"

To answer this, the study utilizes firm-level data from the European Investment Bank Investment Survey (EIBIS), applying a multivariate logistic regression model to a weighted sample of over 20,000 firms. By distinguishing between financial drivers (profitability, usage of external financing) and strategic drivers (digital maturity, opportunity perception), this research aims to isolate the true determinants of the "green leader". Additionally, the relevance of policy support in driving climate-oriented investments is discussed and a Hypothesis derived for future investigation. The empirical findings offer a novel perspective: contrary to standard theory, green investment is driven less by current financial slack and more by strategic foresight and digital readiness.

1.3 Structure of the Thesis

This thesis initially establishes the theoretical foundations by discussing the "Pecking Order Theory," the "Porter Hypothesis," and the "Twin Transition," in Chapter 2 before deriving the specific testable hypotheses in Chapter 3. The empirical analysis begins in Chapter 4, which details the EIBIS dataset, the "Latest Entry" cleaning approach, and the definition of the tested independent and dependent variables. Chapter 5 specifies the econometric approach, justifying the use of a Multivariate Logistic Regression model and outlining robust validity checks. Finally, Chapter 6 presents and discusses the results, highlighting the dominance of behavioral and digital drivers over financial metrics. Chapter 7 concludes with a summary of contributions, policy implications for the EU industrial strategy, and avenues for future research.

2. Literature Review

2.1 Theoretical Foundations of Green Investment

The concept of "green investment" varies significantly across academic literature and policy frameworks, often depending on the granularity of data available. As the data used is coming from the European Investment Bank Investment Survey (EIBIS), green investment is defined as follows: investment in measures to improve energy efficiency and investment in other environmental protection measures, such as waste minimization, pollution control, and recycling (European Investment Bank, 2024). This definition aligns with the broader taxonomy used by the OECD (2012), which characterizes green investment as capital allocation towards assets that reduce greenhouse gas (GHG) emissions, enhance energy efficiency, or mitigate environmental degradation.

To understand the drivers of such investments, one must first address the market failures that typically inhibit them. The theoretical consensus, grounded in environmental economics, posits that private sector investment in green technologies is suboptimal due to the "double externality" problem (Rennings, 1998). The first externality is environmental: firms do not bear the full social cost of their emissions, and thus, without regulatory intervention or internal pricing mechanisms, they lack the incentive to reduce them (Ambec et al., 2013). The second is a knowledge externality: the R&D and innovation required to develop green technologies often create spillover benefits for competitors and society, preventing the investing firm from appropriating the full returns of their innovation. Standard neoclassical theory therefore suggests that without external correction through measures like carbon pricing or subsidies, firms will underinvest in environmental technologies relative to the social optimum.

However, the Resource-Based View (RBV) of the firm offers a contrasting perspective, suggesting that environmental investment is not a cost but a strategic capability. Khanra et al. (2022) argue that green innovation can serve as a rare and non-substitutable resource that enhances firm competitiveness. This aligns with the "Porter Hypothesis," which proposes that well-designed environmental regulations can trigger innovation that partially or fully offsets the costs of compliance (Porter and van der Linde, 1995). By investing in energy efficiency or circular economy practices, firms may improve operational efficiency, reduce input costs, and achieve product differentiation. Implicitly, high-performing firms should be investing in green technologies not solely for compliance, but to secure a competitive advantage, a mechanism

that underpins the relationship between profitability and green investment tested later in this study (Khalid, 2023).

The decision to undertake green investment is fundamentally a corporate finance decision, constrained by the availability and cost of capital. In a frictionless market, as described by the Modigliani and Miller (1958) irrelevance theorem, a firm's investment decisions would be independent of its financing structure. However, real-world capital markets are characterized by information asymmetries and agency costs (Myers and Majluf, 1984), making green projects particularly susceptible to financing frictions. How firms navigate these constraints, and whether credit markets act as enablers or bottlenecks for the green transition, is examined in Section 2.2.

Finally, a theoretical distinction must be made regarding the type of green investment, specifically between “end-of-pipe” technologies and integrated cleaner production. End-of-pipe solutions, such as filters or waste treatment plants, are additive measures that reduce pollution after it has been generated, typically representing a pure cost to the firm (Rennings, 2000). In contrast, integrated technologies modify the production process itself to prevent pollution at the source. As demonstrated by Frondel et al (2007), it is primarily these integrated investments that align with the Resource-Based View, as they are more likely to generate the efficiency gains and competitive advantages predicted by the Porter Hypothesis (Porter and van der Linde, 1995). The result is that end-of-pipe investments are often driven solely by regulatory compliance, while integrated eco-innovations are frequently associated with strategic intent and higher potential for economic returns (Frondel et al 2007)

2.2 Financial Determinants and Constraints

The relationship between firm financial structure and investment behavior is grounded in the “Pecking Order Theory” (Myers and Majluf, 1984): Due to information asymmetries between firm insiders (managers) and outsiders (investors), firms prioritize the financing sources that are least sensitive to information costs. Firms prefer internal funds (retained earnings) first, followed by debt, and finally equity. In the context of green investment, this hierarchy is often exacerbated. Environmental technologies are frequently characterized by high upfront capital intensity, long payback periods, and significant technological uncertainty (Siedschlag and Yan, 2021). These characteristics heighten the information asymmetry problem, as external lenders may struggle to accurately assess the risk-return profile of novel green projects compared to conventional "brown" investments (Accetturo et al., 2024).

However, recent empirical evidence challenges the strict application of the Pecking Order Theory to environmental projects, suggesting a “green advantage” in credit markets. Investigating the sensitivity of investment to cash flow, Oliviero et al. (2024) find that green firms are actually less financially constrained than their non-green counterparts. They demonstrate that the investment decisions of green firms are less sensitive to internal cash flow, implying easier access to external credit. This aligns with the findings of the European Central Bank (2025), which reports that banks increasingly incorporate climate risks into their lending criteria, effectively offering a 'climate discount' to sustainable firms and rationing credit for carbon-intensive 'brown' issuers. Capital markets adapt this “green premium”, effectively expecting lower yields from green bonds and equities, as they are treated as a hedge against climate change. This results in a lower reliance on internal funds for green companies as financial markets actively seek to finance the transition.

Nonetheless, the reliance on debt financing through banks or green bonds has inherent limitations when applied to eco-innovation. Debt providers are risk-averse by nature as their upside is capped at the interest rate, while their downside includes total default. This structure makes them ill-suited for financing early-stage, high-risk green technologies that possess significant information asymmetries and uncertain cash flows (Hall and Lerner, 2010). For such transformative projects, equity financing and Venture Capital (VC) play a decisive role. Mazzucato and Semieniuk (2018) emphasize that although banks are essential for the diffusion of mature technologies (such as standard renewable energy projects), public funding and risk-tolerant private equity are the primary drivers of innovation. Therefore, a firm’s financial constraint is not only about the quantity of available capital, but the type of capital relative to the technological maturity of its green projects.

External credit supply plays an essential role in enabling scale. While the Pecking Order Theory suggests a preference for internal funds, the capacity to undertake transformative green investment often necessitates external capital, particularly for SMEs that lack sufficient retained earnings (Siedschlag and Yan, 2021). In recent years, several policy initiatives aiming to reduce the information frictions associated with external green financing were developed. These policies (including green bond markets and taxonomy-aligned lending) should improve the availability of capital for green investments (European Investment Bank, 2024). If they are effective, improved access to external finance should enable firms to invest beyond their internal means.

The literature presents a tension between the theoretical preference for internal funds and the capital intensity that green projects demand in practice. Contradicting a strict Pecking Order interpretation, this thesis posits that access to external capital is a prerequisite rather than a last resort for firms seeking to invest in green measures.

2.3 The "Twin Transition": Digital and Environmental Synergies

The term "Twin Transition" refers to the relationship of digital transformation and environmental sustainability that emerged as a central pillar of European industrial policy and academic inquiry. Muench et al. (2022) define this concept as a synergistic process where digital technologies act as enablers of the green transition. The theoretical premise relies on the capacity of digitalization to lower information costs and optimize resource allocation, making environmental investments more financially and operationally viable in the process.

The primary mechanism linking these two domains is operational efficiency through data analytics. Digital technologies, such as the Internet of Things (IoT), Big Data, and Artificial Intelligence (AI), allow firms to monitor their carbon footprint. Energy consumption, waste streams, and supply chain emissions become more transparent (Maucorps et al., 2023). By reducing this information asymmetry, digitalization lowers the cost of identifying and implementing green improvements. For example, a firm with advanced digital capabilities can more easily deploy smart energy management systems, turning an abstract environmental goal into a quantifiable target.

Beyond operational efficiency, the literature suggests a deeper strategic complementarity between digital and green capabilities. Cimini and Kalantzis (2024) argue that firms undergoing digital transformation develop organizational adaptability and innovation capacities that are transferable to environmental projects. Implementing green technologies often requires complex changes to production processes and business models, similar to the disruptions caused by digitalization. Firms that have already successfully integrated digital technologies possess the "absorptive capacity" and managerial skills necessary to navigate the complexities of green investment projects. Montresor and Vezzani (2023), find that digital firms are significantly more likely to introduce eco-innovations, suggesting that digital and green strategies are mutually reinforcing rather than competing for scarce capital.

Nonetheless, the synergy is not automatic. The "Twin Transition" also presents a coordination challenge. While digital assets can optimize green performance, they also compete for the same

financial and human resources within the firm. If a firm is financially constrained, the high capital requirements of digitalization might crowd out green investments (Cimini and Kalantzis, 2024). Therefore, finding a positive correlation between digital and green investment would indicate that the synergistic benefits like innovation capability and operational efficiency outweigh this “crowding out effect” of competing for resources.

In the context of the twin transition it must be noted that despite these synergies, the environmental benefits of digitalization are subject to the “Rebound Effect” (or Jevons Paradox). Digital technologies enhance energy efficiency, but the resulting cost reductions often incentivize firms to increase overall production or consumption, potentially negating the initial environmental savings (Santarius et al., 2020). Lange et al. (2020) warn that without explicit governance or pricing mechanisms, the efficiency gains from the “Twin Transition” may lead to a net increase in aggregate resource consumption. This implies that for the digital transition to truly enable the green transition, investment in digital assets must be coupled with absolute decoupling strategies rather than relative efficiency targets alone.

Despite theorized crowding out effects, the operational and strategic benefits of digitalization appear to outweigh these costs. Therefore, this thesis proposes that digital implementation acts as a net enabler rather than a competitor, leading to a reinforcing relationship where digitally advanced firms are more likely to undertake green investments.

2.4 Firm Performance and Strategic Positioning

Empirically, the literature suggests a complex, bidirectional relationship between financial performance and green investment. On one hand, consistent with the Slack Resources Theory, Siedschlag and Yan (2021) find that firms with higher initial productivity are more likely to invest, as they possess the financial buffer necessary to absorb the risks of green innovation. However, this relationship is not just one of affordability, but also one of strategic advantage. Khalid (2023) demonstrates that for EU firms, the causality runs in the opposite direction as well: green investment notably enhances corporate profitability. This finding supports the Porter Hypothesis which states that environmental investments generate “innovation offsets”. These improvements in resource productivity partially or fully offset compliance costs (Porter and van der Linde, 1995). Thus, rather than being a luxury reserved for wealthy firms, green investment serves as a driver of future financial performance, creating a virtuous cycle between sustainability and profitability. Profitability also acts as a signal of managerial quality and

operational efficiency. Firms that are better at managing their core business are theorized to be better at managing the complex integration of sustainability (Ambec et al., 2013).

Economic Value Added (EVA) and other value-creation metrics refine this view by accounting for the cost of capital. From a shareholder value perspective, green investments are justified if they enhance the firm's long-term competitive positioning or reduce its risk profile (Pástor et al, 2021). High-margin firms may use green investments as a differentiation strategy to protect their market share against regulatory changes or shifting consumer preferences, effectively treating environmental protection as an insurance policy against "transition risks" (European Central Bank, 2025).

However, a competing perspective suggests that the relationship may be weak or non-existent due to the "Efficiency Paradox." Highly profitable firms in mature industries may face less pressure to innovate or change their existing "brown" but lucrative business models. Conversely, firms with lower current profitability but high growth potential might be the ones aggressively investing in green technologies to disrupt the market. If green investment is driven primarily by regulatory compliance rather than strategic choice, then profitability may not be a significant determinant at all, as both high- and low-performing firms must meet the same legal thresholds (Borghesi, Cainelli and Mazzanti, 2015).

Finally, it is crucial to recognize that the relationship between financial performance and green investment may not be linear. Heubeck and Ahrens (2025) provide evidence of an inverted U-shaped relationship between slack resources and ESG activities in private firms. Even though financial slack is necessary to fund innovation, excessive slack can lead to managerial complacency or inefficient capital allocation, dampening the drive for further environmental improvement. This nuance aligns with Ambec and Lanoie (2008), who caution that firms 'stuck in the middle' - investing enough to incur costs but not enough to achieve strategic differentiation - often suffer the worst financial outcomes. The positive correlation between green investment and profitability found by studies like Khalid (2023) may be driven primarily by high-performing 'green leaders' at the optimal point of this curve, rather than representing a universal law applicable to all firms

Predicting the exact relationship between profitability and green investment is complex, but the dominant framework for this study remains the Slack Resources Theory. Firms with

superior financial performance should possess the necessary buffer to absorb the risks of environmental projects. Therefore, this study assumes a baseline positive correlation.

2.5 Policy Support as External Enabler

Whilst firm-level characteristics such as financial capacity and strategic positioning are critical, the external policy environment remains a fundamental determinant of green investment. The theoretical justification for public intervention lies in the "double externality" framework previously discussed: without correction, the private returns on green investment are lower than the social returns (Rennings, 1998). Public financial support, ranging from direct grants and subsidies to loan guarantees, serves to bridge this gap by reducing the effective cost of capital and sharing the risk of technological uncertainty between the public and private sectors.

Recent evidence from the European Investment Bank (2024) highlights that policy support is particularly effective for financially constrained firms. Casati and Kalantzis (2024) argue that public instruments do not crowd out private investment but rather "crowd in" activity by validating the commercial viability of green technologies and easing collateral requirements. This mechanism is crucial for SMEs, which often lack internal liquidity to front-load the costs of energy efficiency or decarbonization projects. In this context, policy support acts as a "financial lever," amplifying the ability of the private sector to respond to regulatory signals.

However, accurately modeling the impact of policy support poses significant empirical challenges. As noted by Anderson et al. (2011) and further explored in recent ECB analyses (2025), the availability of such support is often non-random; grants are frequently targeted at specific sectors or regions, or conversely, claimed only by the most informed and administratively capable firms. This creates a selection bias where the recipient firms may differ systematically from non-recipients in unobservable ways. Even if the theoretical prediction is clear (public support should positively drive investment), the empirical isolation of this effect requires granular data that is often sparse or structurally limited in broad surveys.

A central concern in the evaluation of such public support is the concept of "additionality". Policy interventions are only economically efficient if they trigger investments that would not have occurred in the absence of support (Criscuolo et al., 2019). If a firm receives a subsidy for a green project it had already planned to undertake based on private returns, the public funds represent a "windfall gain" rather than a stimulus. Empirical evidence on this front is mixed; while grants often demonstrate high additionality for financially constrained SMEs and risky

R&D projects, they are less effective for large, unconstrained firms adopting mature technologies. This distinction suggests that the impact of policy is highly heterogeneous, depending less on the volume of support and more on the precise targeting of marginal projects that face genuine financing gaps.

Despite these potential “windfall gains” in certain contexts, the expectation remains that public financial support acts as a catalyst by reducing the effective cost of capital and sharing the risk of technological uncertainty. Grants and subsidies should attract private investment, particularly for capital constrained SMEs. As a result, public support is hypothesized to be a significant driver of green investment.

2.6 Behavioral and Contextual Mechanisms

Standard economic models typically assume that investment decisions are based purely on rational financial calculations. Net Present Value (NPV), cost of capital, and expected cash flows being the dominant KPIs considered to take investment decisions in classical investment theory. Applying these KPIs to decide on investments in the transition to a green economy falls short. They involve significant uncertainty and have less quantifiable outcomes and benefits, thus making them also heavily dependent on behavioral aspects. The "Managerial Perception" literature suggests that the decision-makers' perception of environmental issues frame significantly influences investment outcomes (Horbach, 2008). To be more specific, whether the management of a firm considers the green transition to be a risk instead of an opportunity will affect whether the firm adapts green practices.

The framing of the green transition affects the subjective discount rates applied to investment projects. If management views the transition primarily as a risk and "regulatory burden" or compliance cost, they are likely to adopt a reactive posture, investing the minimum amount necessary to avoid fines (Anderson et al., 2011). In contrast, some managers perceive the transition as a strategic "business opportunity" that enables the company to enter new markets, attract green-conscious consumers, or improve brand reputation. In this case, managers are more likely to proactively commit resources, even if the immediate financial payback is less certain (Ambec et al., 2013).

This temporal mismatch is formally described by Carney (2015) as the “Tragedy of the Horizon”. Just like the catastrophic impacts of climate change, the returns on green investment to mitigate them often materialize over a longer time horizon than the standard business cycle

or the tenure of current management. Even if a green investment has a positive Net Present Value (NPV) over twenty years, the short-term orientation inherent in financial reporting and executive compensation structures creates a behavioral bias against it. Consequently, managers may reject economically viable green projects because the reputational and financial rewards of those investments will accrue to their successors. On the other hand, the capital costs and implementation risks are borne immediately.

The divergence in the investment behavior of “reactive” and “proactive” firms should clearly be observable. Even though the “Tragedy of the Horizon” suggests a general bias against long-term green projects, an opportunistic framing of the transition should overcome said bias. This implies that the cognitive framing of environmental issues could be a stronger predictor of investment behavior than pure financial constraints, as it determines the willingness to commit resources under uncertainty.

2.7 Structural and Geographic Determinants

Even with financial, technological, and strategic factors being the primary drivers of firm-level investment decisions, empirical analysis must also account for the structural heterogeneity of firms. Standard economic theory and previous empirical studies consistently identify firm size, sectoral affiliation, and geographic location as control variables that shape the baseline probability of green investment.

2.7.1 Firm Size and Resource Availability

The relationship between firm size and innovation is grounded in the Schumpeterian hypothesis, which postulates that large firms are more likely to engage in innovative activities due to their ability to spread fixed R&D costs over a larger volume of sales and their superior access to capital markets. In the context of environmental economics, Horbach (2008) confirms that larger firms are much more likely to adopt environmental management systems and green technologies. This size premium is attributed to the presence of specialized departments for regulatory compliance and greater financial “slack.” Conversely, Small and Medium-sized Enterprises (SMEs) often face disproportionately high barriers to entry. As highlighted by Siedschlag and Yan, (2021), SMEs are more vulnerable to information asymmetries and credit rationing, restricting their ability to finance capital-intensive green projects despite high willingness to adopt. Therefore, controlling for firm size is essential to isolate the effect of financial and strategic variables from the simple scale effect of the enterprise.

2.7.2 Sectoral Heterogeneity and Regulatory Exposure

The propensity to invest in green technologies varies systematically across economic sectors due to differences in pollution intensity and regulatory scrutiny. Firms in "dirty" industries, such as manufacturing, energy, and construction, are typically subject to stricter environmental regulations and higher abatement costs compared to the services sector (Jaffe and Palmer, 1997). The baseline probability of green investment is higher in these sectors, often driven by compliance requirements rather than voluntary strategic choice. The EIB Investment Survey (2024) consistently shows that energy-intensive industries lead in the adoption of energy efficiency measures. Failing to control for sectoral affiliation would risk confounding the analysis, as a positive correlation between profitability and green investment could simply reflect that capital-intensive (and potentially high-margin) industrial firms are heavily regulated.

However, the stringency of environmental regulation also introduces the risk of 'Carbon Leakage.' The Pollution Haven Hypothesis (PHH) posits that in an open economy, strictly regulated firms may relocate production to jurisdictions with laxer environmental standards rather than investing in local green technologies (Copeland and Taylor, 2004). Although empirical evidence for the PHH within the European Union is limited due to harmonized directives, the risk remains for trade-exposed industries competing globally. This structural threat implies that for certain sectors, the propensity to invest in green technology is not only a function of local regulatory pressure but also of the degree of trade openness and the ability to pass through compliance costs to consumers without losing market share.

2.7.3 Geographic and Institutional Context

Finally, the institutional and economic environment of the country in which a firm operates plays a decisive role. Investment incentives are shaped by national energy policies, the availability of public infrastructure, and the maturity of local financial markets. Maucorps et al. (2023) emphasize that the "Twin Transition" is not spatially uniform across Europe; firms in Northern and Western Europe often benefit from more robust innovation ecosystems and stricter environmental enforcement compared to those in cohesion regions. Furthermore, Casati and Kalantzis (2024) demonstrate the existence of regional spillovers, where firms are more likely to invest in green technologies if they are located in regions with a high density of green innovators. Therefore, any analysis for strategic technological and financial determinants should include country fixed effects to consider the stringency of national climate laws or the

efficiency of the judicial system. This makes sure that the estimated coefficients for financial and strategic drivers are not biased by cross-country structural differences.

3. Hypothesis Development

Building upon the theoretical foundations and empirical evidence established in the literature review, specific hypotheses are derived and tested. The conceptual framework posits that corporate green investment is not a unidimensional decision but the outcome of interacting financial, technological, strategic, and behavioral drivers.

3.1 Financial Capacity and Access to Credit

As discussed in Section 2.2, the high capital intensity of green projects often exceeds the internal financing capacity of firms, necessitating access to credit to achieve scale. Contradicting a strict Pecking Order interpretation, it is expected that firms capable of securing external funding will be better positioned to undertake environmental projects than those relying solely on internal cash flow. The following hypothesis will be tested:

H1: Firms that rely more on external financing to finance their investments are more likely to invest in green measures.

3.2 Digital and environmental twin transition

Literature suggests extensive synergies between digitalization and decarbonization, where digital assets lower the information costs and implementation barriers of green projects. Despite potential resource competition, the operational efficiencies gained are expected to dominate, creating a positive correlation between the two strategies:

H2: Firms that implement digital technologies (as defined in the EIBIS) in their operations, are more likely to invest in green technologies, due to reinforcing effects.

3.3 Firm Performance and profitability

Drawing from the Slack Resources Theory, financial performance should be a key determinant of green adoption. Despite recent studies suggesting potential non-linearities (Heubeck and Ahrens, 2025), the baseline expectation remains that profitable firms possess

more of the necessary resources to absorb the risks of transformation. This should result in a propensity to invest in capital intense green projects.

H3: Firms with higher profitability are more likely to invest in environmental technologies as part of competitiveness and innovation strategies.

3.4 The Role of Public Policy

Public financial instruments are designed to correct market failures by subsidizing the risk of green investment. For financially constrained firms, Casati and Kalantzis (2024) argue that grants "crowd in" private capital by validating the viability of green technologies and easing collateral requirements. This mechanism is theoretically central to any comprehensive account of corporate green investment, particularly for SMEs lacking the internal liquidity to front-load environmental projects.

Testing this hypothesis empirically requires a reliable firm-level measure of grant receipt. As detailed in Chapter 4, the relevant EIBIS survey module suffers from data limitations that render its inclusion in the main model untenable. H4 is therefore excluded from the empirical analysis, but derived here as a theoretically grounded proposition for future research.

H4: Firms receiving public financial support are more likely to invest in green projects, especially under liquidity constraints.

3.5 Managerial Perception and Behavioral Framing

Cognitive framing in decision-making under uncertainty is expected to be a significant determinant. Horbach (2008) and Ambec et al. (2013) suggest that managers who view the transition as a business opportunity apply lower discount rates to environmental projects. Consequently, the model should confirm the following Hypothesis:

H5: Firms that perceive the green transition primarily as an opportunity instead of a risk invest more readily in green technologies.

4. Data and Variables

4.1 Data Source and Sample Construction

This study relies on firm-level data obtained from the European Investment Bank Investment Survey (EIBIS), a flagship annual survey that gathers qualitative and quantitative information on the investment activities, financing conditions, and performance of approximately 12,000 firms across the European Union. The dataset provides a unique, stratified perspective on the European corporate sector, ensuring representativeness across all 27 Member States, four major economic sectors (Manufacturing, Construction, Services, and Infrastructure), and four firm size classes ranging from micro-enterprises to large corporations.

To construct an econometrically sound sample suitable for multivariate logistic analysis, the initial raw dataset of approximately 1.5 million observations was cleaned. First, the sample was geographically restricted to firms operating within the European Union, excluding observations from the United States to isolate the specific regulatory and economic context of the EU Single Market. Second, strict criteria were applied to handle missing data; observations lacking responses for the primary dependent variable (green investment) or essential financial metrics were removed to ensure model validity.

The panel structure of the EIBIS data requires a special approach to avoid duplicate counting of individual firms. Since the survey re-interviews a portion of firms across multiple years, treating every observation as independent would introduce pseudo-replication bias, potentially inflating statistical significance. At the same time the dependent variable explains any green investment that occurred in the last 3 years and was only introduced in 2020. Therefore, counting every year's entry of any firm would inflate its impact on the model. On the other hand, purely analyzing a single year would drastically reduce the sample size. To mitigate this, a "Latest Entry" approach was implemented. The dataset was sorted by unique respondent identifiers and survey years, and only the most recent available observation for each distinct firm was retained (2021–2023). This procedure effectively transformed the unbalanced panel into a robust cross-sectional snapshot of the latest available corporate strategic positions, ensuring that each data point represents a unique, independent economic agent. Finally, those companies containing refused or uninformed answers for the firm profitability were excluded to establish a linear categorical variable for profit margins. Following these cleaning procedures, the final analytical sample consisted of 20,726 unique firm-level observations ($N = 20,726$). To correct for any sampling imbalances and ensure that the descriptive and

econometric results reflect the aggregate economic structure of the EU, value-added weights (*weight_va*) were applied throughout the analysis.

4.2 Variable Definitions and Operationalization

The variables employed in the econometric model were derived from specific items in the EIBIS questionnaire and harmonized to test the hypotheses regarding financial, technological, and behavioral drivers of green investment.

4.2.1 Dependent Variable

The primary outcome variable, Green Investment (*green*), is a binary indicator constructed to capture active corporate engagement in environmental sustainability. While the raw survey data (Q78) includes categorical responses detailing specific technologies, this study utilizes the aggregated binary variable defined by the EIB, which takes the value of 1 if the firm invested in measures to improve energy efficiency or to mitigate and adapt to the impacts of climate change in the previous financial year, and 0 otherwise. This definition ensures that the analysis captures both mitigation and adaptation strategies, aligning the findings with broader EIB policy taxonomies.

4.2.2 Independent Variables

To test the "Financial Capacity" hypothesis (H1), the variable External Financing (*pct_external_fin*) was operationalized using data from question Q27, which asks firms to break down their investment funding sources. This continuous variable represents the percentage of total investment financed through external channels - such as bank loans, private equity, or public debt - as opposed to internal retained earnings. A higher percentage indicates a greater reliance on capital markets, allowing the model to test whether access to external credit acts as a prerequisite for capital-intensive green projects or whether the "pecking order" preference for internal funds dominates.

The "Twin Transition" hypothesis (H2) is tested using the Digital Implementation (*digital*) variable. This binary indicator distinguishes between digital adopters and non-adopters. A firm is coded as "Digital" (1) if it has implemented at least one advanced digital technology relevant to its sector, such as 3D printing, robotics, the Internet of Things (IoT), or big data analytics, and 0 otherwise. This operationalization serves as a proxy for the firm's technological absorptive capacity and organizational agility.

Firm Performance (H3) is captured through profitability (*profitmargin_over_turnover*), derived from survey question Q49, asking for profit before tax as a percentage of turnover, expressed as 1 of 5 categories: (1) Under 2%; (2) 2% to 5%; (3) 5% to 10%, (4) 10% to 15%; (5) 15% or more. Prior to analysis, the raw data was cleaned to handle non-responses; specifically, negative coding for "Refused" and "Don't Know" responses was recoded as missing values to prevent these observations from being conflated with low performance. Using a relative margin rather than absolute profit figures is essential for normalizing performance across firms of vastly different scales, thereby isolating the effect of financial efficiency from simple size effects. Notably, alternative specifications using absolute profits (e.g., *plaftertax*) were tested but yielded no statistical significance, confirming that margin-based metrics are the more relevant driver in this context.

To account for behavioral heterogeneity (H5), the variable Managerial Perception (*transition_opp*) was generated from question Q71. This binary variable identifies firms whose management perceives the transition to stricter climate standards and regulations primarily as a "business opportunity" (1), as opposed to those viewing it as a risk or having a neutral impact (0). This captures the cognitive framing that precedes strategic resource allocation.

4.2.3 Exclusion of Policy Support from the Sample

An adjustment was required regarding the "Public Policy Support" hypothesis (H4). The initial research design intended to include a variable identifying firms that received public grants (*received_grant*). However, data inspection revealed that this specific survey module suffered from high non-response rates. Including this variable in the multivariate model caused listwise deletion of approximately 58% of the sample, reducing the observations from $N \approx 20,726$ to $N \approx 9,500$

This drastic reduction in sample size compromised the statistical power of the model and introduced potential selection bias, as firms that answer detailed grant questions may differ systematically from those that do not. Prioritizing model stability and sample representativeness, the variable was excluded from the primary regression. Consequently, H4 is not tested in the main model, ensuring that the estimates for financial (H1) and strategic (H2, H5) drivers remain robust and generalizable to the broader population.

4.2.4 Control Variables

Finally, the model includes a set of fixed effects to control for structural confounders. Company Size is included as a categorical factor (Micro, Small, Medium, Large) to account for the Schumpeterian scale advantages where larger firms possess greater resources for environmental compliance. Additionally, sector-specific and country-specific fixed effects are employed to absorb unobserved heterogeneity arising from varying regulatory intensities, industrial pollution levels, and national economic conditions.

5. Methodology

5.1 Research Design and Econometric Specification

To empirically investigate the determinants of corporate green investment, this study utilizes a multivariate logit model. Since the dependent variable, Green, is binary (taking the value of 1 if the firm invests and 0 otherwise), standard Ordinary Least Squares (OLS) estimation is theoretically inappropriate. OLS, or the Linear Probability Model (LPM), suffers from heteroscedasticity by definition and, can generate predicted probabilities outside the logical [0,1] unit interval, leading to biased and inconsistent estimators (Wooldridge, 2010).

Consequently, a Multivariate Logistic Regression (Logit) model is applied. The Logit model relies on the cumulative logistic distribution function to estimate the probability (P) that a firm i undertakes green investment, conditional on a vector of firm-specific characteristics (X_i). The model is expressed as:

$$P(\mathit{Green}_i = 1|X_i) = \Lambda(Z_i) = \frac{e^{Z_i}}{1 + e^{Z_i}} \quad (1)$$

Where Z_i represents the latent variable (the propensity to invest) defined by the linear equation:

$$Z_i = \beta_0 + \beta_1 \mathit{Finance}_i + \beta_2 \mathit{Digital}_i + \beta_3 \mathit{Profit}_i + \beta_4 \mathit{Perception}_i + \gamma \mathit{Controls}_i + \epsilon_i \quad (2)$$

The parameters β are estimated using the Maximum Likelihood Estimation (MLE) method, which iteratively finds the coefficient values that maximize the likelihood of observing the actual sample data (Greene, 2018). To aid interpretation, Average Marginal Effects (AME) are reported alongside the logit coefficients in Table 3. Since the logit model is non-linear, coefficients cannot be interpreted as constant marginal probabilities. The AME addresses this by computing the marginal effect for each observation and averaging across the full sample,

producing an estimate of the average change in the probability of green investment per unit increase in each variable (Greene, 2018).

5.2 Estimation Strategy and Sampling Weights

To ensure the econometric results reflect the true economic structure of the European Union, the estimation procedure incorporates specific adjustments for survey design:

Population Weights: All regression specifications apply value-added weights ($[pw=weight_va]$). This corrects for the stratified sampling design of the EIBIS, ensuring that firms contributing more to the EU's GDP have a proportional influence on the estimated coefficients.

Robust Standard Errors: A common issue in cross-sectional firm data where the variance of the error term differs across firm sizes, is potential heteroscedasticity. Huber-White robust standard errors are calculated for all estimates to ensure that the statistical significance of the findings is not inflated by model assumptions.

5.3 Validity and Robustness Checks

To validate the structural integrity of the Logit results, three specific robustness checks were performed:

Multicollinearity Check: A theoretical concern in "Twin Transition" literature is that digital adoption and green opportunity perception might be collinear (i.e., digital firms are inherently the "optimistic" ones). To verify they are distinct drivers, a pairwise correlation analysis was conducted.

Functional Form Robustness (Probit Model): To ensure the findings are not artifacts of the logistic distribution assumption, the model was re-estimated using a Probit specification, which assumes a normal distribution of error terms.

Predictive Power (AUC-ROC): The goodness of fit is evaluated using the Area Under the Curve (AUC). Unlike the Pseudo- R^2 , which can be misleading in non-linear models (McFadden, 1974), the AUC measures the model's ability to discriminate between investors and non-investors.

6. Results and Discussion

6.1 Descriptive Statistics and Correlations

Table 1 presents the summary statistics for the weighted sample ($N = 20,726$). The descriptive data reveals that 50.87% of firms in the sample actively invested in green measures, indicating a relatively balanced split between adopters and non-adopters. Regarding the independent variables, digital adoption is widespread, with 66.19% of firms classified as having implemented at least one advanced digital technology. In contrast, only 27.36% of firms view the green transition primarily as an opportunity, highlighting a potential gap in managerial optimism regarding climate policy. It also demonstrates an overrepresentation of large firms in the survey data.

Table 1: Descriptive Statistics (N = 20,726)

Variable	Type	Mean / Proportion	Std. Dev.	Min	Max
Dependent Variable					
Green Investment	Binary	50.87%	0.500	0	1
Independent Variables					
Digital Implementation	Binary	66.19%	0.473	0	1
Opportunity Perception	Binary	27.36%	0.446	0	1
External Finance Share	Continuous	28.43%	35.937	0	100
Profit Margin (Scale)	Categorical	2.58	1.224	1	5
Firm Size (Composition)					
Micro (5–9 employees)	Categorical	9.05%	-	0	1
Small (10–49 employees)	Categorical	20.33%	-	0	1
Medium (50–249 employees)	Categorical	21.26%	-	0	1
Large (250+ employees)	Categorical	49.36%	-	0	1

Sector (Composition)					
Manufacturing (C)	Categorical	35.76%	-	0	1
Services (G/I)	Categorical	28.28%	-	0	1
Construction (F)	Categorical	8.76%	-	0	1
Other (D/E/H/J)	Categorical	27.20%	-	0	1

To address potential concerns regarding multicollinearity a pairwise correlation analysis was conducted. As shown in Table 2, the correlation coefficient between Digital Implementation and Transition Opportunity is $r = 0.113$. This low positive association indicates that despite a slight overlap, the two variables represent distinct strategic channels. None of the independent variables overlap with green investments, confirming that these characteristics are not interdependent and that the applied multivariate regression model is statistically sound. A firm can be digitally advanced without viewing the green transition as an opportunity or investing in green and vice versa.

Table 2: Pairwise Correlation Matrix

	(1) Green Investment	(2) Digital	(3) Transition Opportunity	(4) Ext. Finance Share	(5) Profit Margin
(1) Green Investment	1.000	0.162	0.134	0.063	-0.039
(2) Digital Implementation		1.000	0.113	-0.028	0.027
(3) Transition Opportunity			1.000	-0.017	0.042
(4) Ext. Finance Share				1.000	-0.100
(5) Profit Margin					1.000

Note: Lower triangle shown. All correlations computed on the weighted sample ($N = 20,726$).

6.2 Determinants of Green Investment

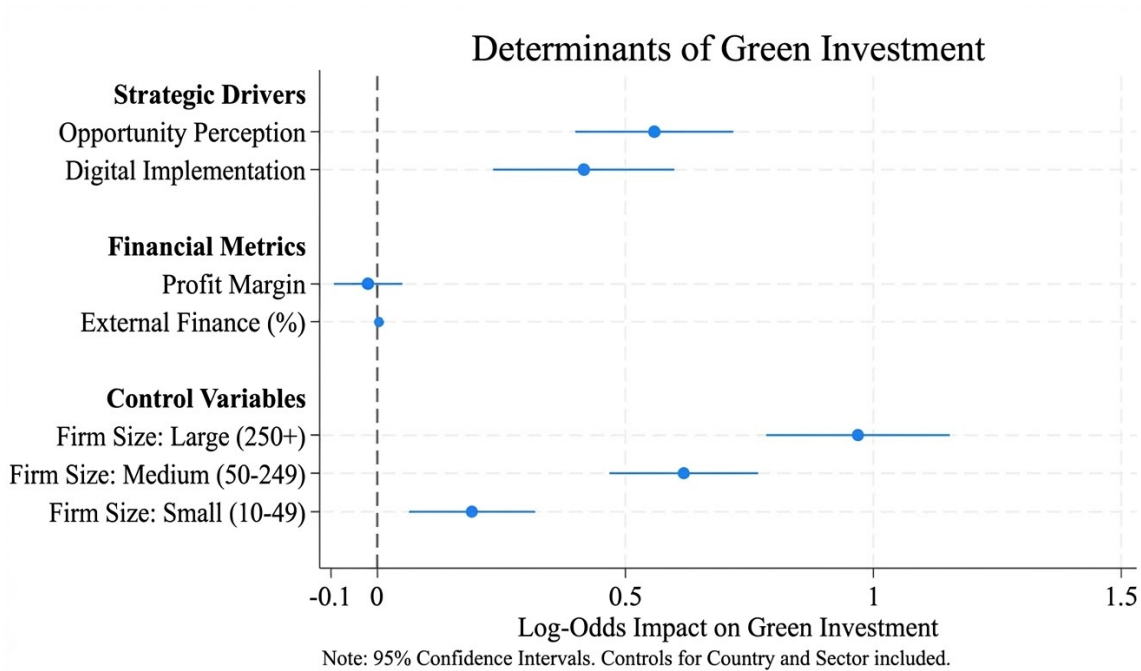
Table 3 presents the results of the Multivariate Logistic Regression (Logit) estimating the probability of corporate green investment. The model controls firm size, sector, and country fixed effects. Standard errors are robust to heteroscedasticity.

Table 3: Determinants of Corporate Green Investment

Independent Variable	(1) Logit Model	(2) Probit Model	(3) AME	Hypothesis Status
H5: Opportunity Perception	0.559***	0.344***	0.122	✓ Strong
H2: Digital Implementation	0.416***	0.256***	0.091	✓ Strong
H1: External Finance (%)	0.005***	0.003***	0.001	✓ Weak
H3: Profitability	-0.017 (ns)	-0.010 (ns)	-0.004 (ns)	✗ Rejected
Size: Medium (50–249)	0.618***	0.380***	0.141	Control
Size: Large (250+)	0.969***	0.600***	0.220	Control
Sector: Construction	-0.420***	-0.256***	-0.093	Control
Sector: Services	-0.006 (ns)	-0.003 (ns)	-0.009	Control
Observations (N)	20,726			
Pseudo R²	0.086			
Validity (AUC)	0.693			

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. $N = 20,726$. Standard errors adjusted for heteroscedasticity; weighted by value-added. AME = Average Marginal Effects. Reference groups: Micro firms, Manufacturing sector, Austria.

Graph 1: Determinants of Corporate Green Investment



The empirical analysis yields a distinct profile of the European corporate green investor: they are digitally mature, strategically optimistic about the climate transition, and heavily reliant on scale. Yet, surprisingly, their current profitability is not a decisive factor. These findings complement several prevailing theories surrounding the twin transition and management perception of the green transition, simultaneously challenging conventional assumptions regarding the financial situation of firms and their corporate investment behavior.

6.2.1 Strategic and Behavioral Drivers

The model provides robust empirical support for the hypothesis that green investment is primarily a strategic and behavioral phenomenon rather than a purely financial one.

Regarding Managerial Perception (H5), the model identifies the behavioral framing of the climate transition as the strongest predictor of investment behavior. The coefficient for Opportunity Perception is positive and highly significant ($\beta = 0.559, p < 0.01$). Translated into marginal effects, firms whose management perceives the green transition as a business opportunity are 12.2 percentage points more likely to invest than identical firms that view it as a risk. This finding confirms Hypothesis 5, validating the behavioral framework established by Horbach (2008) and Ambec et al. (2013), which posits that firms viewing environmental regulation as a business opportunity apply lower subjective discount rates to green projects.

The magnitude of this effect suggests that the perception of individual decision makers is a decisive factor in unlocking capital for the green transition, outweighing purely tangible constraints. Aligned with the literature discussed in Chapter 2, the findings suggest that standard financial metrics (NPV, ROI) are insufficient to explain green adoption. In the face of high uncertainty and long payback periods, the decision to invest is driven by a cognitive commitment to a future business model. With the highest coefficient in the model ($\beta = 0.559$), the framing of the green transition as an "opportunity" rather than a risk is the single strongest predictor of investment behavior. Firms that view decarbonization as a chance to capture new markets or enhance competitiveness are willing to commit resources even when immediate financial returns are not guaranteed, likely focusing more on integrated solutions that lower energy consumption altogether. Conversely, firms that view the transition as a regulatory burden appear to adopt a "wait-and-see" approach, investing only the minimum required amount with a focus on end-of-pipe solutions to minimize compliance risks.

Similarly, Hypothesis 2 concerning Digital Synergies is strongly supported by the data. The coefficient for Digital Implementation is 0.416 and statistically significant at the 1% level. Digitally advanced firms are 9.1 percentage points more likely to invest in green measures than non-digital firms, holding all else constant. This result empirically validates the "Twin Transition" strategy and the complementarity hypothesis derived from Muench et al. (2022) and Cimini and Kalantzis (2024). The statistical significance indicates that digital adoption acts as an enabler for environmental performance, likely by lowering information costs and enhancing the organizational agility required to implement complex green projects. The magnitude of this effect suggests that digital maturity is not merely correlated with green investment but is enabling it. Firms that have already built the organizational and data infrastructure for digital transformation are better positioned to identify, justify, and execute green projects. This is consistent with the absorptive capacity argument of Cimini and Kalantzis (2024) and confirms that the Twin Transition operates as a genuine complementarity rather than a resource competition.

6.2.2 Financial Drivers and Constraints

The results regarding financial capacity present a more nuanced picture that indicates an overall weak relationship between a firm's tendency to invest in green and its financial circumstances. Hypothesis 1 (External Financing) is supported, though the effect size is modest compared to behavioral drivers. The variable External Finance Share exhibits a positive and statistically

significant relationship with green investment ($\beta = 0.005$, $p < 0.01$). In marginal terms, each additional percentage point of external financing increases the probability of green investment by 0.10 percentage points. Taken across a realistic range, a firm moving from 0% to 20% external financing sees a cumulative increase in probability of approximately 2.1 percentage points. As theorized in the derivation of H1, this contradicts a preference for internal funds suggested by the Pecking Order Theory. The capital-intensive nature of green projects seems to necessitate access to external forms of financing. While the small magnitude of the coefficient ($\beta = 0.005$) might imply that finance acts merely as an enabler, it is important to consider the scale of the variable (measured as a percentage from 0 to 100).

But even when considering this effect, the marginal impact of relying on external financing sources is smaller compared to strategic drivers. Considering that green investments are more capital intensive than other investments (Siedschlag and Yan, 2021), the connection found with the applied model could stem from the correlation between average investment amount and the share of external financing, offering the starting point for further research.

Contrary to the "Slack Resources Theory" (Bourgeois, 1981), which posits that wealthy firms are the primary innovators, this study finds no significant relationship between profit margins and green investment. In fact, the coefficient flipped to negative ($\beta = -0.017$) in the final model, though it remains statistically indistinguishable from zero. This "Profitability Paradox" implies that green investment has moved beyond the realm of "luxury" projects for high-performing firms, challenging the assumption that current financial surplus is a prerequisite for environmental proactivity. Instead, it appears to be driven by strategic necessity or regulatory pressure that affects firms regardless of their current bottom line. One possible explanation for this effect is the significant capital expenditure of green investments and their long payback cycles. Meaning that the reported profitability simply decreases in years where green investment took place. This interpretation implies a reverse causality concern that the cross-sectional design of this study cannot resolve and is acknowledged as a limitation in Chapter 7. The insignificance could also reflect the inverted U-shaped relationship between slack resources and ESG activity proposed by Heubeck and Ahrens (2025). Finally, it is also possible that the most profitable firms in mature industries (e.g., fossil-fuel-reliant manufacturing) are stuck in "efficiency traps," optimizing existing brown technologies rather than disrupting their business models.

6.2.3 Structural Control Variables

The control variables behave according to theoretical expectations, confirming the reliability of the model specification ($Pseudo R^2 = 0.086$). The size gradient is particularly pronounced: compared to micro firms, medium firms are 14.1 percentage points more likely to invest and large firms 22.0 percentage points more likely, both highly significant ($p < 0.001$). Small firms show a more modest 4.1 percentage point premium. This steep scale effect confirms the presence of Schumpeterian size advantages and underlines the structural barriers faced by smaller firms in accessing the organizational and financial capacity required for green investment. Additionally, sectoral heterogeneity is significant, with Construction firms 9.3 percentage points less likely to invest compared to the Manufacturing baseline, reflecting specific structural barriers to decarbonization in that industry.

6.3 Model Validity and Robustness Checks

To ensure the reliability of these findings, two distinct validation tests were performed. First, the model was re-estimated using a Probit specification to test if the results were sensitive to the distributional assumptions of the Logit model. As shown in Table 3, the Probit coefficients exhibit the exact same direction and statistical significance patterns as the Logit model ($H5 \beta(Probit) = 0.344^{***}$); ($H2 \beta(Probit) = 0.256^{***}$) The consistency between these two estimation methods confirms that the identified relationships are structural and robust. Second, the predictive validity of the model was assessed using the Area Under the Curve (AUC). The model achieves an AUC of 0.693. This score indicates that the combination of behavioral, financial, technological, and structural variables successfully discriminates between green investors and non-investors.

7. Conclusion

7.1 Summary of Findings

This thesis set out to answer the research question: "What firm-level and financial factors influence green investments in European private sector companies?" By analyzing a representative sample of 20,726 firms from the European Investment Bank Investment Survey (EIBIS), the study provides robust empirical evidence on the drivers of the corporate green transition.

The central finding of this research is that green investment is predominantly driven by strategic and behavioral factors rather than purely financial performance. The analysis identifies managerial perception (H5) as the single strongest predictor of environmental investment. Firms whose management views the green transition as a business opportunity are significantly more likely to invest than those who view it as a risk.

Furthermore, the study confirms the existence of a strong "Twin Transition" effect. Digital implementation serves as a robust enabler of green investment, suggesting that firms leverage digital capabilities to execute complex environmental projects.

Financially, the results challenge the "Slack Resources Theory." Profitability was found to be statistically insignificant, indicating that current financial surplus is neither a necessary nor sufficient condition for green investment. External Financing plays a significant but supplementary role, acting as an enabler for capital-intensive projects but not as a primary driver of the investment decision itself. Should capital markets become more climate-oriented, the observed effect could become more meaningful in the future.

Additionally, firm size emerges as a significant structural determinant, with large firms substantially more likely to invest than micro enterprises, underscoring the organizational and informational barriers faced by SMEs. The role of public financial support, while theoretically central, could not be tested empirically due to data constraints and remains a priority for future research.

Taken together, these findings suggest that green investment in the European private sector has decoupled from financial performance and is instead mediated by cognitive and technological readiness, challenging the assumption that environmental proactivity is a privilege of financially strong firms with preferred access to capital markets. Rather, innovative and opportunistic companies are the ones driving the green transformation in Europe.

7.2 Implications for Policy and Practice

Current EU policy heavily emphasizes financial de-risking through grants and guarantees. The exclusion of H4 prevents a direct critique of these instruments, yet the dominance of H5 suggests that financial support alone is insufficient. If the primary barrier to investment is the perception of "risk" versus "opportunity," policymakers must focus on reducing information asymmetry. This could involve stronger market signals that validate the "business case" for sustainability, shifting managerial mindsets from compliance to opportunity. This is

particularly relevant given that opportunistic firms are more likely to pursue integrated eco-innovations rather than mere end-of-pipe compliance solutions, contributing more sustainably to emission goals.

The strong link between digital and green adoption implies that policy silos should be broken down. Funding programs that treat digitalization and decarbonization as separate streams may be suboptimal. Instead, integrated support mechanisms that help firms (especially SMEs) upgrade their digital infrastructure will likely generate positive spillovers for their environmental performance. Policy interventions should therefore prioritize technical assistance and "capacity building" for SMEs to help identify green opportunities instead of solely providing capital.

7.3 Limitations and Future Research

Although these findings are robust, several limitations must be acknowledged to contextualize the results properly.

First, the cross-sectional nature of the "Latest Entry" approach, while necessary to maximize sample size, limits the ability to make strict causal inferences. The model observes a strong positive association between digital adoption and green investment, yet it cannot definitively prove that digitalization causes green investment without a longitudinal time-series analysis.

A related concern applies to the profitability finding. The cross-sectional design cannot rule out reverse causality: firms undertaking large green capital expenditures may report lower profit margins in the same period, which would mechanically suppress the observed relationship between profitability and investment. A panel approach using lagged profitability as the independent variable would be better suited to isolate the directional effect and test whether financial slack genuinely precedes green investment decisions. Furthermore, future empirical models should explicitly test for non-linearities, such as the inverted U-shaped relationship proposed by Heubeck and Ahrens (2025), to determine if excessive financial slack eventually breeds complacency rather than driving continuous eco-innovation. Additionally, a model that separates integrated investments and end-of-pipe solutions as dependent variables could generate valuable insights into the effects either of these investment-types has on profitability in practice.

A further limitation concerns the role of public financial support. Including the grant receipt variable caused listwise deletion of approximately 58% of the sample due to high non-response

rates in the relevant EIBIS module. Beyond the loss of statistical power, firms responding to detailed grant questions may differ systematically from non-respondents, creating a selection problem irresolvable within this cross-sectional framework. The "crowding-in" effect of EU financial instruments on private green investment therefore remains untested, and represents a direct priority for future empirical work using matched administrative and survey data.

Also, large companies were overrepresented in the sample, leaving room for additional research on micro and small firms, especially given the significant correlation between company size and green investment. Inspecting what helps boost green investment amongst smaller firms could be especially relevant to policy makers.

Furthermore, the aggregated nature of the external financing variable presents a limitation. To better understand the financial drivers of green investment, future research should disaggregate external finance to test whether risk-tolerant equity and venture capital are stronger drivers of transformative eco-innovation than traditional, risk-averse bank debt or green bonds, as theorized by Mazzucato and Semieniuk (2018).

Finally, given the dominance of the behavioral variable, qualitative research into why certain managers perceive the transition as an opportunity and others don't would provide invaluable insights for policymakers aiming to accelerate the private sector's environmental transition.

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9. Declaration of Use of Generative AI

I, Jacob Hinz, a student of the Bachelor in International Business Administration program at the Comillas Pontifical University, upon submitting my Bachelor's Thesis titled "Determinants of Green Investment in the European Private Sector: A Regression-Based Analysis of European Company Data", hereby declare that I have used Generative Artificial Intelligence tools, such as ChatGPT or similar AI coding/text tools, only within the context of the activities described below:

1. **Research Brainstorming:** Used to devise and outline potential research areas.
2. **References:** Used in conjunction with other tools, such as Science, to identify preliminary references which I subsequently verified and validated.
3. **Methodological Advisor:** Used to discover methods applicable to specific research problems.
4. **Code Interpreter:** Used to perform preliminary data analysis.
5. **Literary Style and Language Editor:** Used to improve the linguistic and stylistic quality of the text.
6. **Reviewer:** Used to receive suggestions on how to improve and refine the work at various levels of rigor.

I affirm that all information and content presented in this thesis is the product of my individual research and effort, except where otherwise indicated. I am aware of the academic and ethical implications of submitting non-original work and accept the consequences of any violation of this statement.

Date: 15/03/2026

A handwritten signature in black ink, appearing to read 'Jacob Hinz', written over a horizontal line.

10. Appendix

Stata Script

Note: Stata commands indicated by *cursive text*

PART 1: DATA PREPARATION & CLEANING

1.1 Convert Panel Data to Cross-Sectional (Last Entry Approach): Sort by company ID and year (ascending) to keep the most recent observation, remove entries without values for green.

drop if missing(green)

sort respondent_id year
bysort respondent_id: keep if _n == _N

1.2 Restrict Sample Geography: Drop US benchmark firms to focus strictly on the European corporate sector

capture drop if country == 29

1.3 Define variables based on EIBIS questionnaires

rename q27_2 pct_external_fin
label variable pct_external_fin "External Finance % (H1)"

label variable digital "Digital Implementation (H2)"

rename q49 profitmargin_over_turnover
label variable profitmargin_over_turnover "Profit Margin 1-5 Scale (H3)"

1.4 Clean Financial Variable (Profit Margin): Convert negative codes (-1 for "Don't Know", -2 for "Refused") to missing values and generate transition opportunity as binary variable (from 1 = "risk", 2 = "neutral", 3 = "opportunity", 4 = "No Answer")

replace profitmargin_over_turnover = . if profitmargin_over_turnover < 0

gen transition_opp = (q71 == 3) replace transition_opp = . if q71 >= 4
label variable transition_opp "Climate Opportunity Perception (H5)"

PART 2: DESCRIPTIVE STATISTICS & CORRELATION

2.1 Summary statistics for continuous and binary variables

summarize green digital transition_opp pct_external_fin profitmargin_over_turnover
[aw=weight_va]

2.2 Sample composition percentages for Categorical Variables

tab company_size [aw=weight_va]
tab company_sector [aw=weight_va]

2.3 Pairwise correlation matrix to test for multicollinearity

```
correlate green digital transition_opp pct_external_fin profitmargin_over_turnover [aw=weight_va]
```

PART 3: MAIN REGRESSION MODELS

3.1 Model 1: Main Logit Specification

```
logit green digital i.company_size pct_external_fin profitmargin_over_turnover transition_opp  
i.company_sector i.country [pw=weight_va], vce(robust)  
estimates store Logit_Final
```

3.2 Model 2: Probit Robustness Check

```
probit green digital i.company_size pct_external_fin profitmargin_over_turnover transition_opp  
i.company_sector i.country [pw=weight_va], vce(robust)  
estimates store Probit_Final
```

PART 4: MODEL VALIDITY & ROBUSTNESS (AUC)

4.1 Calculate Area Under the Curve (AUC) on the unweighted sample

```
quietly logit green digital i.company_size pct_external_fin profitmargin_over_turnover  
transition_opp i.company_sector i.country, vce(robust)  
capture drop p_green_check  
predict p_green_check if e(sample), pr  
roctab green p_green_check, summary
```

PART 5: DATA VISUALIZATION (FOREST PLOT)

5.1 Generate Coefficient Graph for the Main Logit Model

```
coefplot Logit_Final, keep(2.company_size 3.company_size 4.company_size  
profitmargin_over_turnover pct_external_fin transition_opp digital) xline(0)  
coeflabels(transition_opp = "Opportunity Perception" digital = "Digital Implementation"  
pct_external_fin = "External Finance (%)" profitmargin_over_turnover = "Profit Margin"  
2.company_size = "Small (10-49)" 3.company_size = "Medium (50-249)" 4.company_size = "Large  
(250+)") headings(2.company_size = "{bf:Firm Size}" profitmargin_over_turnover = "{bf:Financial  
Metrics}" transition_opp = "{bf:Strategic Drivers}") graphregion(color(white)) title("Determinants  
of Green Investment") xtitle("Log-Odds Impact on Green Investment") note("Note: 95% Confidence  
Intervals. Controls for Country and Sector included.")
```