Mind the green gap: Can climate-related financial policies effectively shift institutional investments?

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Abstract

This study investigates the effectiveness of Climate-Related Financial Policies (CRFPs) in influencing financial institutions' climate finance commitments and their actual investment behaviors globally. Despite increasing regulatory efforts to align financial markets with climate objectives, significant discrepancies exist between institutions' formal commitments and capital allocation practices. Employing a Generalized Linear Mixed Model (GLMM) and panel quantile regression methodologies, the analysis leverages the Net Zero Finance Tracker (NZFT) dataset from the Climate Policy Initiative (CPI), providing comprehensive insights into climate-related targets, policy engagements, and investment patterns across different financial institution types. The findings reveal that while stronger CRFPs significantly increase institutions' formal climate commitments, disclosure, and policy engagement, they inadequately constrain fossil fuel financing or drive meaningful shifts toward climate-aligned investments. Institutional responses are heterogeneous and strongly influenced by operational characteristics and macroeconomic conditions, such as market liquidity, credit availability, and inflation rates. These results underscore the critical limitations of current regulatory frameworks and highlight the necessity for integrated policy approaches that combine stringent enforcement mechanisms with targeted incentives to effectively channel financial flows toward substantial decarbonization.

JEL codes: G18, G28, O55, E58, F64, Q54
Keywords: Climate-related financial policies, Sustainable finance, Regulatory frameworks, Climate risk governance, Financial institutions, Capital allocation, Decarbonization, Green investments, Fossil fuel financing, Institutional heterogeneity, Net Zero Finance Tracker (NZFT)

1 Introduction

The financial sector is critical in advancing climate mitigation and adaptation efforts by allocating capital towards sustainable investments and integrating climate risks into financial decision-making (Carney, 2015; Campiglio, 2016; NGFS, 2020; Monasterolo et al., 2024). Climate-Related Financial Policies (CRFPs) have emerged as key regulatory mechanisms aimed at aligning financial markets with climate objectives by mandating disclosure, incorporating climate risks into financial supervision, and incentivizing sustainable finance (D'Orazio and Popoyan, 2019; D'Orazio and Thole, 2022). Despite the growing prominence of these policies, their effectiveness in driving institutional engagement and investment reallocation remains an open question (Krogstrup and Oman, 2019; EBA, 2022b,a; Coelho and Restoy, 2022, 2023; D'Orazio and Pham, 2025).

This study investigates the impact of CRFPs on financial institutions' climate finance commitments and their investment decisions, specifically focusing on the extent to which regulatory policies influence green lending, project-level investment in climate solutions, and fossil fuel financing. While existing literature has examined the aggregate effects of CRFPs (see, e.g., D'Orazio and Pham, 2025), little attention has been given to their heterogeneous effects across different financial institution types. This study addresses this gap by providing a comprehensive empirical assessment of how climate-related policies shape financial institutions' climate finance adoption and investment behavior.

The motivation for this research stems from the urgent need to understand whether current financial regulations effectively support the transition to a low-carbon economy. While CRFPs signal a regulatory commitment to sustainable finance, their ability to translate into substantive changes in capital allocation remains uncertain. A key question is whether these policies merely encourage formal climate commitments, such as risk disclosure and policy engagement, or whether they also constrain fossil fuel financing and redirect capital towards green investments (Ameli et al., 2019, 2021; Steuer and Tröger, 2022; ECB, 2020).

To empirically assess these questions, this study employs a Generalized Linear Mixed Model (GLMM) to estimate the probability of financial institutions adopting climate finance targets, engaging in policy discussions, and implementing risk management strategies. Additionally, a panel quantile regression approach is applied to examine the differential effects of CRFPs and macroeconomic factors on green lending, climate investment, and fossil fuel financing at various points in the distribution of financial flows. This methodological framework allows for an in-depth analysis of whether financial institutions respond uniformly to climate-related financial policies or whether their responses vary by institutional type and financial market conditions.

This paper makes two main contributions. Firstly, it captures the misalignment between formal climate finance commitments and actual investment patterns, with a particular focus on the differential responses of various financial institutions to CRFPs. Secondly, it introduces a novel approach by utilizing the Net Zero Finance Tracker (NZFT) dataset (Micale et al., 2024), developed by the Climate Policy Initiative (CPI), to assess financial institutions' climate commitments, policy engagement, and financial flows related to climate-aligned investments. This dataset provides a unique empirical basis for evaluating the effectiveness of CRFPs and offers valuable insights into financial flows and climate-aligned investments. The results highlight a critical tension: while CRFPs positively influence institutional climate risk disclosure and policy engagement, they do not necessarily translate into a significant reduction in fossil fuel financing. This finding highlights the limitations of current regulatory frameworks in driving capital reallocation. Furthermore, the study identifies macroeconomic and financial conditions - such as credit availability, stock market performance, and inflation - as key determinants that shape financial institutions' green lending and fossil fuel investment decisions. Overall, these insights provide valuable policy implications for strengthening financial regulations to ensure that climate-related financial commitments lead to meaningful decarbonization efforts.

The structure of the paper is as follows. Section 2 presents the background of the study, and section 3 presents the research questions and hypotheses, outlining the expected relationships between climate-related financial policies, institutional climate action, and financial market conditions. Section 4 describes the data and methodology, explaining the construction of key variables, the econometric framework, and the identification strategy. Section 5 presents the empirical results, first discussing the effects of CRFPs on institutional climate finance adoption and then analyzing the investment patterns associated with green lending, climate solutions, and fossil fuel financing. Finally, Section 6 summarizes the key insights and recommendations for future research and policy development.

2 Background and literature review

Climate-Related Financial Policies (CRFPs) have become essential regulatory tools to align financial markets with global climate goals. These policies typically involve mandatory disclosure of climate-related financial risks, integration of climate factors into supervisory frameworks, and incentives to foster sustainable finance practices (D'Orazio and Pham, 2025; OECD, 2024). International financial governance institutions increasingly emphasize the necessity for robust management of climate-related financial risks, highlighting their strategic relevance within global policy agendas (Adrian, 2023; Coelho and Restoy, 2023). Financial institutions, including banks, asset managers, insurers, and pension funds, play a central role in financing the transition to a low-carbon economy through capital allocation and risk management decisions (Krueger et al., 2020; Monasterolo et al., 2024). Yet, institutional responses to climate finance frameworks vary significantly, influenced by distinct incentives, investment horizons, and regulatory contexts (Kahn and Winton, 2004; David and Zeke, 2022). Due to their substantial financial influence, pension funds significantly shape global investment trends toward decarbonization. Despite publicly stated commitments to sustainability, pension funds frequently demonstrate a notable divergence between their policy intentions and actual investment behavior (Boermans and Galema, 2019; Thomä et al., 2021; Egli et al., 2022; Rempel and Gupta, 2020; McDonnell, 2024). Specifically, Boermans and Galema (2019) highlight that pension funds have progressed slowly in decarbonizing portfolios, with larger institutions responding more robustly due to regulatory and stakeholder pressures. Similarly, Thomä et al. (2021) observe limited practical climate action among Swiss pension funds, attributing this inertia primarily to the absence of stringent regulatory mandates. Further, Egli et al. (2022) find that regulatory frameworks, public scrutiny, and financial risk perceptions significantly influence fossil fuel divestment decisions among European pension funds, emphasizing reputational concerns and the risks associated with stranded assets.

However, pension funds frequently encounter conflicts between their climate-related goals and fiduciary responsibilities focused on short-term returns, hindering comprehensive shifts toward sustainable investment portfolios (Rempel and Gupta, 2020). Historical analyses reveal structural constraints such as legal obligations, return expectations, and perceived transition risks, collectively impeding the effective achievement of net-zero investment targets (McDonnell, 2024). Recent findings from Micale et al. (2024) further illustrate that despite the widespread adoption of net-zero commitments among European pension funds, concrete strategies for implementation significantly lag behind stated ambitions. The existing literature provides limited insights into the specific effectiveness of CRFPs, predominantly focusing on broader aspects of climate finance such as risk disclosure, transparency, and overall market reactions (Bolton and Kacperczyk, 2023; Emambakhsh et al., 2023). Explicit analyses evaluating how clearly defined CRFPs directly influence institutional capital allocation decisions remain scarce. Moreover, previous studies have not extensively utilized detailed, institution-level datasets to assess differentiated responses across financial institution types or economic conditions. This knowledge gap limits the design and effectiveness of targeted regulatory interventions. This paper addresses these gaps by employing a novel empirical approach using the Climate Policy Initiative's Net Zero Finance Tracker (NZFT) dataset (Micale et al., 2024). Unlike previous datasets, the NZFT provides granular information on institutions' climate commitments, engagement levels with climate-related policies, and actual financial flows into climate-aligned projects. This comprehensive data enables an in-depth analysis of how effectively institutional commitments translate into substantive investment decisions, bridging existing research gaps. This study aims to inform targeted policy development by evaluating whether current regulatory frameworks and financial sector initiatives effectively drive significant decarbonization through capital reallocation. Addressing the gaps between institutional commitments and actual financial behavior, the findings offer practical insights for policymakers and regulators striving to achieve meaningful shifts toward a low-carbon economy.

Building on this empirical foundation, this paper introduces an institutional-theoretic lens to interpret observed heterogeneity. Drawing on principal-agent theory (Jensen and Meckling, 1976; Krueger et al., 2020), we posit that asset managers and banks face divergent incentives in aligning capital flows with climate goals due to conflicting mandates and short-term performance pressures. Additionally, institutional isomorphism (DiMaggio and Powell, 1983; Mosley, 2010) explains widespread but superficial convergence in formal climate commitments , driven more by reputational and peer pressures than internalized behavioral change. These frameworks help to explain why CRFPs may lead to disclosure without reallocation, and engagement without divestment. Moreover, regulatory arbitrage theory (Braithwaite and Drahos, 2000; Tadjeddine and Tarik, 2021) highlights that institutions may strategically respond to soft or fragmented regulations by engaging in symbolic compliance rather than substantive transition.

3 Research questions and hypotheses

Climate-Related Financial Policies (CRFPs) have become key regulatory tools for aligning financial markets with global climate goals (FSB, 2020, 2022; BCBS, 2021). By mandating climate risk disclosures, integrating climate considerations into supervisory frameworks, and incentivizing sustainable investments, CRFPs seek to accelerate the financial sector's transition toward sustainability. Previous research has primarily evaluated the aggregate effects of CRFPs (D'Orazio and Pham, 2025; Bhandary et al., 2021), leaving unexplored the nuanced differences across types of financial institutions and variations in investment behaviors at different levels of climate-aligned financial activity.

This study addresses these gaps through the following research questions:

- RQ1: To what extent do Climate-Related Financial Policies (CRFPs) influence financial institutions' formal engagement with climate finance actions?
- RQ2: How do these policies affect financial institutions' actual investment behavior, specifically regarding green lending, project-level investments in climate solutions, and fossil fuel financing?
- RQ3: Do the effects of CRFPs vary across financial institution types, and if so, how?

To empirically investigate these questions, we apply a twofold methodological framework. First, a Generalized Linear Mixed Model (GLMM) examines the determinants of institutional engagement with climate finance, accounting for institutional heterogeneity and country-specific factors. Second, we use panel quantile regression to explore whether CRFPs and macroeconomic factors differentially influence financial institutions' capital allocation patterns toward green lending, direct investment in climate solutions, and fossil fuel financing. This combined methodological approach allows for a comprehensive assessment of whether and how institutional responses vary by institutional type, policy stringency, and financial market conditions.

3.1 Hypotheses development

The role of climate-related financial policies CRFPs create regulatory incentives encouraging financial institutions to integrate climate considerations into investment and risk management. By increasing transparency and aligning financial flows with climate objectives, we hypothesize:

- H1: Financial institutions operating in jurisdictions with stronger CRFPs are more likely to engage in formal climate-related financial actions.

Institutional heterogeneity in climate finance action Financial institutions differ significantly regarding investment horizons, risk management strategies, and regulatory constraints (Kahn and Winton, 2004; Monasterolo, 2020; Ehlers et al., 2022). Asset managers and owners typically oversee long-term portfolios and are more likely to internalize climate risks into their decisions (Battiston et al., 2021; Eren et al., 2022; Krueger et al., 2020). In contrast, banks and insurers often prioritize short-term financial stability, potentially limiting their responsiveness (Fankhauser et al., 2016). We hypothesize:

- H2: CRFPs' effect on climate finance adoption varies across financial institution types, with asset managers and owners responding more strongly than banks, insurers, and private equity/venture capital/hedge funds.

Differential effects on investment patterns Institutional responses to CRFPs are likely heterogeneous across different levels of financial market activity, reflecting differences in compliance costs, financial constraints, and market conditions. We hypothesize:

- H3: The influence of CRFPs on institutions' investment patterns toward green lending, climate solutions, and fossil fuels varies significantly across different levels of financial activity and market development.

To test these hypotheses comprehensively, a GLMM is used to analyze institutional engagement, while panel quantile regression assesses how CRFPs and macroeconomic conditions influence actual capital allocation decisions at different points of the investment distribution (see Section 4.2).

4 Data and methods

4.1 Data

4.1.1 Geographical scope

The dataset includes financial institutions from 57 countries, covering a diverse geographic range, as illustrated in Figure 1. The classification follows the World Bank's income-level definitions, distinguishing between advanced economies and emerging markets and developing economies (EMDEs). Advanced economies, represented in blue, are high-income countries with well-developed financial markets and institutions, such as the United States, Germany, Japan, and the United Kingdom. In contrast, EMDEs, shown in green, include countries with varying levels of market development and institutional capacity, such as Brazil, South Africa, Malaysia, and Turkey. Countries not included in the dataset are depicted in grey. This classification ensures consistency with global economic analysis frameworks and facilitates comparative assessments of financial institutions across different economic contexts.

4.1.2 Financial institution types

The study categorizes financial institutions into five primary types, each playing a distinct role in capital allocation and risk management. Asset managers, with 1,440 institutions, oversee investment portfolios on behalf of clients, including pension funds, insurance companies, and individual investors. Their ability to direct large-scale capital flows makes them influential in shaping sustainable finance practices. Asset owners, comprising 1,860 institutions, include pension funds, sovereign wealth funds, and insurance companies. They hold and allocate capital over the long term, significantly impacting the alignment of financial flows with climate objectives. Banks, with 780 institutions, provide credit and financial services to businesses and individuals, positioning them as key actors in financing both high-carbon and low-carbon investments. Insurers, numbering 375 institutions, manage risks related to extreme weather events and climate-related losses. By integrating climate risk into their underwriting and investment decisions, they influence market behavior and regulatory developments. Private equity, venture capital, and hedge funds, totaling 250 institutions, operate with higher risk tolerance and invest in emerging technologies and industries, which is crucial in financing early-stage climate solutions.

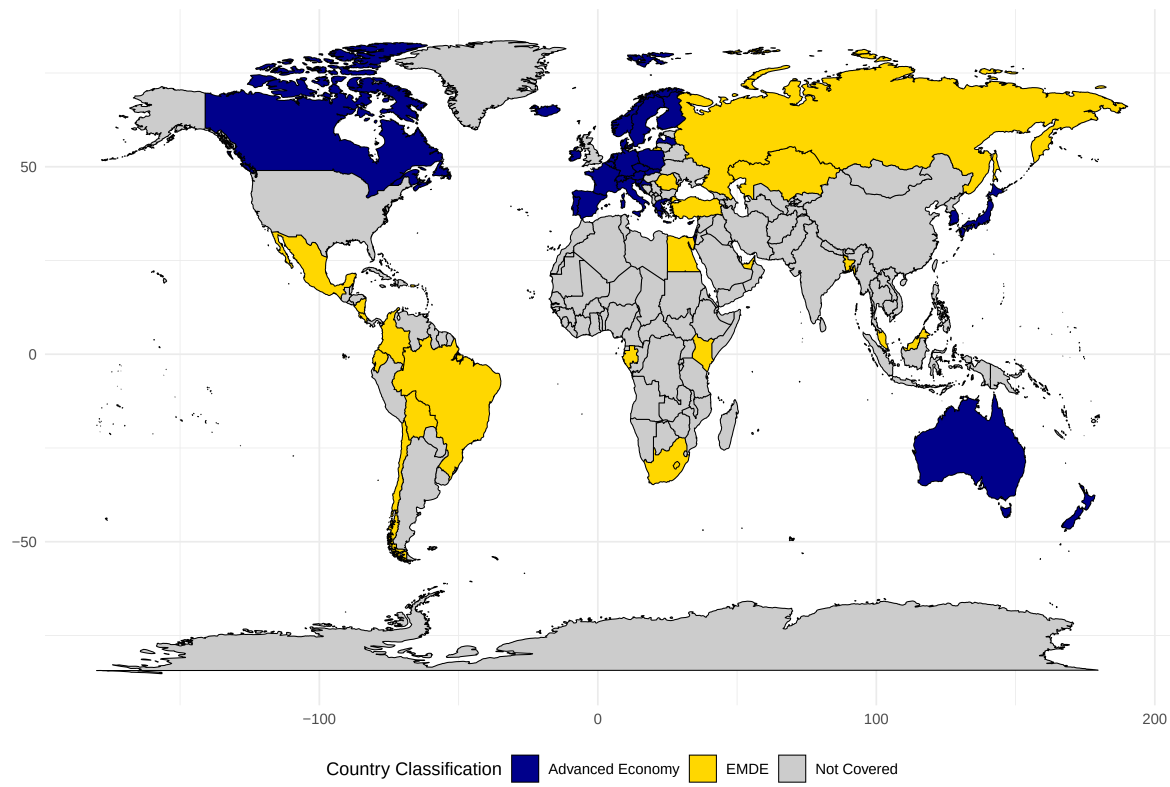

Figure 1: Countries covered in the analysis. Source: Author elaboration.

4.1.3 Climate commitment and policy indicators

This study relies on the Net Zero Finance Tracker (NZFT), a dataset developed by the Climate Policy Initiative (CPI) to assess financial institutions' climate commitments, policy engagement, and financial flows related to climate-aligned investments (Micale et al., 2024).[1] The dataset comprises two main categories of variables: categorical indicators that evaluate climate-related financial policy commitments and their implementation, and continuous variables that measure financial flows toward both green and high-emission projects.

The first set of variables consists of categorical indicators capturing the extent to which financial institutions have integrated climate-related goals into their governance, risk management, and financial strategies. The *target score* is an ordinal measure reflecting the credibility, transparency, and comprehensiveness of climate targets set by financial institutions, covering both short-term and long-term commitments. Institutional commitments to specific policy targets are categorized through *adoption of mitigation targets*, *adoption of climate finance targets*, and *adoption of divestment targets*, which indicate whether explicit emission reduction goals, climate finance objectives, and divestment strategies have been established.

Implementation of climate policies is evaluated using the ordinal *implementation score*, which assesses the degree to which climate targets have been translated into action, including their integration into investment decision-making and risk management frameworks. The governance structure supporting climate policies is assessed through the categorical variable *internal accountability framework*, which captures the presence of executive oversight and institutional mechanisms for ensuring compliance with climate objectives. Institutional engagement with stakeholders is reflected in *shareholder and client engagement*, which denotes efforts to influence corporate climate strategies, and *policy engagement*, which evaluates participation in climate-related financial policy discussions and regulatory reforms.

Financial institutions' risk management strategies related to climate change are categorized through *climate risk strategy* and *climate risk management*, which assess the incorporation of climate risk considerations into decision-making processes, scenario analysis, and stress testing methodologies. Transparency in climate-related reporting is captured through *disclosure of climate risk*, *disclosure of investment data*, and *disclosure of emissions data*, which classify institutions based on the extent of their public disclosure of climate-related risks, investment allocations, and emissions data. These indicators align with international reporting standards, such as the Task Force on Climate-related Financial Disclosures (TCFD).

Figure 2 illustrates the distribution of responses for each categorical variable across financial institutions, showing notable differences in climate commitment across entity types. Asset owners and insurers tend to exhibit higher levels of climate finance target adoption, risk management, and disclosure, while private equity, venture capital, and hedge funds show lower engagement across most dimensions. Banks have an intermediate position, with rela-

[1] The Net Zero Finance Tracker (NZFT), developed by CPI, is an interactive platform that provides a comprehensive assessment of the alignment of financial institutions (FIs) with net-zero goals. It tracks how organizations respond to the ambitions of the Paris Agreement at both strategic and operational levels and examines whether this response translates into Paris-aligned capital allocations and tangible changes in the real economy.

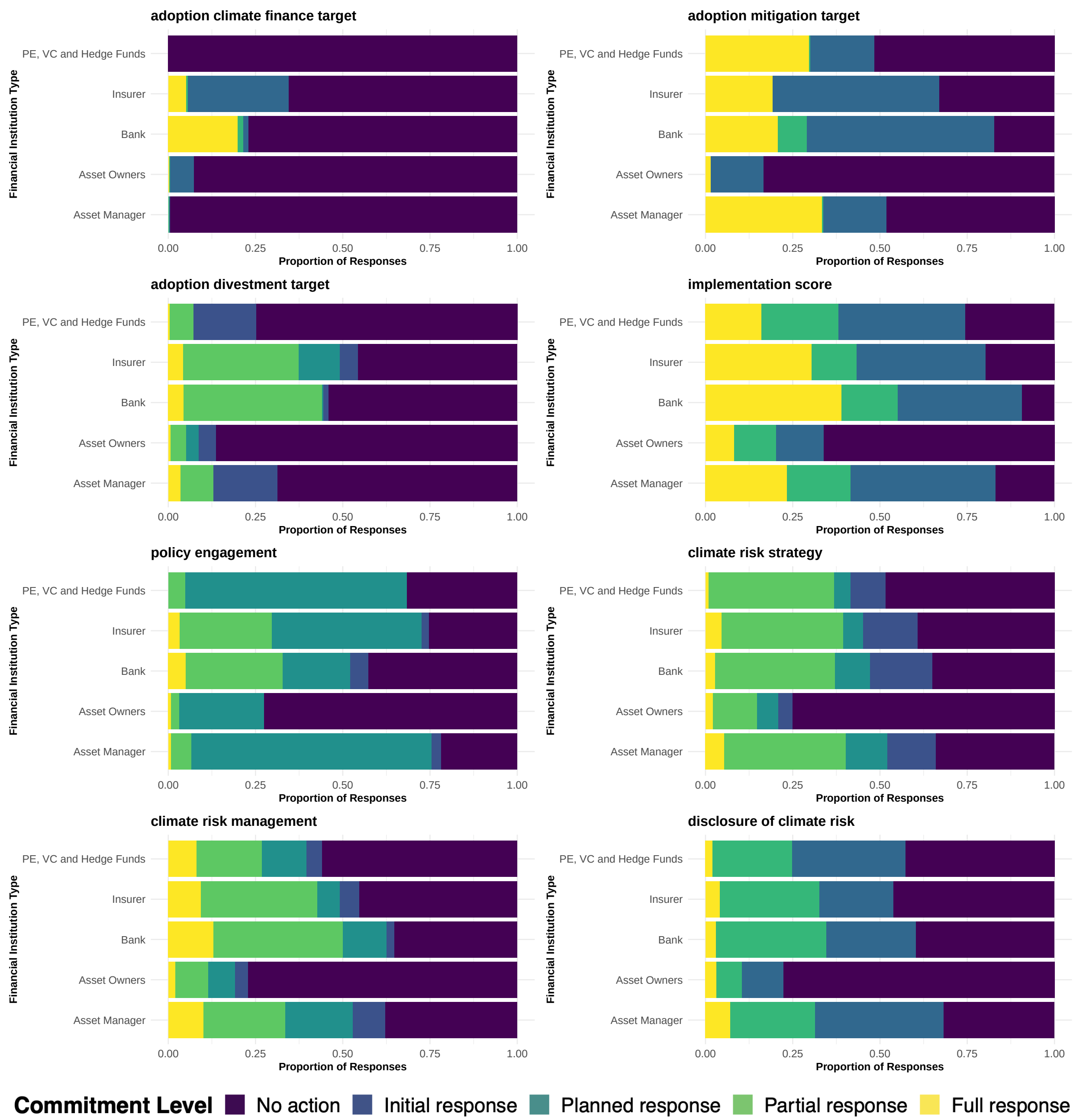

Figure 2: Climate commitment and policy indicators across financial institutions

tively stronger commitments in climate risk disclosure but lower participation in mitigation and divestment targets.

Moreover, the distribution of responses varies by variable. Climate finance targets and policy engagement show relatively higher levels of commitment, with a greater proportion of institutions moving beyond the initial response phase. In contrast, divestment targets exhibit a higher concentration of no action responses, particularly among banks and private equity firms. Implementation scores demonstrate variation, with financial institutions that have strong adoption of climate finance targets also reporting higher implementation levels. Climate risk management and strategy show a moderate level of uptake, with disclosure being the most widespread commitment across all financial institutions.

4.1.4 Climate-related financial policies data

Climate-related financial policies refer to regulatory frameworks and financial sector guidelines aimed at integrating climate risks into financial decision-making and aligning capital flows with climate objectives. These policies play a crucial role in fostering sustainable finance by setting guidelines for financial institutions, incentivizing green investments, and mitigating climate-related financial risks. The effectiveness of these policies depends on their scope, bindingness, and implementation mechanisms, which vary across jurisdictions and financial systems.

This study relies on an updated version of the climate-related financial policy database D'Orazio (2023), which originally included data up to 2020. Data from 2021 to 2023 were manually collected using a structured, multi-step approach to ensure comprehensive coverage of climate-related financial policies. The methodology involved systematically searching official documents on the websites and databases of central banks, financial regulators, ministries, and banking associations using targeted keywords related to climate finance and regulation. Each identified policy was classified by bindingness - mandatory, voluntary, or non-binding - and the responsible authorities were noted. Documents were then reviewed, validated, and cross-checked to ensure accuracy and consistency. Further methodological details are available in D'Orazio and Thole (2022) and D'Orazio (2023).

To categorize the policy types considered in this study, we adopted the taxonomy of the five policy areas comprising the climate-related financial policy index (CRFPI) D'Orazio and Thole (2022). These policies cover key financial sector interventions aimed at addressing climate risks and fostering sustainable finance. The classification includes: *Green prudential regulations (GPP)*: Policies designed to identify and mitigate climate-related financial risks, ensuring financial stability by integrating climate risk considerations into financial supervision and macroprudential frameworks. *Green credit allocation policies (GCA)*: Measures aimed at encouraging green lending and investment through instruments such as credit allocation requirements, lending quotas, and targeted financial incentives. *Green financial principles (GFG)*: Guidelines that promote the development of green or climate-aligned financial markets, including principles for sustainable banking, responsible investment, and the integration of environmental risks into financial decision-making. *Other disclosure requirements (OGD)*: Policies mandating or encouraging public disclosure of climate-related financial risks, including reporting obligations for non-financial institutions such as insurance companies and pension funds. *Green bonds taxonomy and issuing (GB)*: Regulations supporting green lending through green bonds, including the establishment of green bond taxonomies and frameworks for their issuance and verification.

To quantitatively assess the impact of these policies, we compute the *Cumulative Policy Index × Bindingness*, a composite measure that accounts for both the number of policies adopted and their enforceability. Each policy is assigned a weight based on its bindingness level, distinguishing between non-binding, voluntary, and mandatory policies. The index is calculated by summing the binding-weighted policies adopted over time. In cases where multiple policies are introduced within a given year, their respective bindingness scores are aggregated. This metric provides a comprehensive measure of a country's commitment to climate-related financial policymaking, capturing both policy adoption and regulatory strength.

4.1.5 Control Variables

All control variables used in the estimation are sourced from the World Bank's World Development Indicators (WDI) database. Inflation (`infl`), measured as the GDP deflator (annual percentage), reflects changes in the overall price level of goods and services in the economy. Credit to GDP (`cred`) represents the domestic credit provided by the financial sector as a percentage of GDP, serving as an indicator of financial depth and access to credit. Unemployment (`unempl`), reported as the total percentage of the labor force that is unemployed, is based on modeled estimates by the International Labour Organization (ILO). Stocks traded (`stocks`), expressed as a percentage of GDP, captures the total value of stocks traded, reflecting the liquidity and depth of financial markets. In addition to these indicators, CO_2 emissions data, sourced from Crippa et al. (2023), provide insights into the environmental impact of economic activities, capturing the total volume of carbon dioxide emissions generated by a country.

4.2 Methodology

4.2.1 The GLMM approach

To examine how Climate-Related Financial Policies (CRFP) influence the adoption of climate-related actions across different types of financial institutions, we employ a Generalized Linear Mixed Model (GLMM) approach. This allows us to assess the impact of regulatory policies while accounting for both institutional characteristics and country-specific heterogeneity.

A GLMM with a logit link function is used to estimate the probability that a financial institution engages in climate-related finance actions. The key advantage of this approach is the ability to model institutional responses while incorporating unobserved country-level heterogeneity through random effects. This is particularly relevant given that financial market structures, regulatory environments, and institutional strategies vary across jurisdictions.

The main explanatory variable of interest is the climate-related financial policy strength (`cumxbind`), which captures the intensity of regulatory frameworks aimed at promoting climate finance. By estimating the impact of CRFP across different financial institutions, we analyze whether stronger climate policies increase the probability of policy adoption and engagement in climate finance initiatives.

Given that financial institutions operate under different investment horizons, risk exposures, and regulatory obligations, we estimate separate models for distinct financial entity types. Specifically, we analyze the climate finance adoption behavior of five categories of financial institutions: Asset Managers, Asset Owners (pension funds, sovereign wealth funds, insurance companies), Banks, Insurers, Private Equity, Venture Capital, and Hedge Funds. These categories are defined in detail in the data section. By estimating models for each institution type, we assess whether the impact of climate-related financial policies (`cumxbind`) varies across different financial actors."

The original dependent variable captures different levels of institutional climate action: "No action," "Planned response," "Partial response," "Initial response," and "Full response." For estimation, we transform this into a binary outcome:

- $Y_{ij} = 1$ if the institution reports any level of climate-related financial action.
- $Y_{ij} = 0$ if the institution reports "No action."

The estimated GLMM is specified as:

$$\text{logit}(P(Y_{ij} = 1)) = \beta_0 + \beta_1 \text{cumxbind}_{ij} + \beta_2 X_{kij} + u_j \tag{1}$$

where:

- Y_{ij} is a binary indicator of climate action adoption by financial institution i in country j.
- cumxbind_{ij} represents the strength of climate-related financial policies affecting the institution.
- X_{kij} includes macroeconomic and financial variables such as inflation, credit market depth, stock market size, and unemployment.
- $u_j \sim N(0, \sigma_u^2)$ is a country-level random intercept.

The GLMM is estimated via maximum likelihood estimation (MLE) using the adaptive Gauss-Hermite quadrature method.[2]

To assess potential endogeneity concerns, we employ a two-stage residual inclusion (2SRI) approach within the GLMM framework. In this method, residuals from the first-stage regression of the potentially endogenous variable (`cumxbind`) on exogenous covariates are included as an additional control variable in the second-stage estimation. If `cumxbind` were endogenous, the coefficient on the included residuals would be statistically significant.

Across most model specifications, this coefficient is not significant ($p > 0.05$), indicating no strong evidence of endogeneity. While weak significance appears in a few specifications, coefficient stability suggests that any potential endogeneity does not materially affect our results. Based on these findings, we proceed under the assumption that `cumxbind` is exogenous.

[2]The model is implemented using the `glmer()` function from the `lme4` package in R, with the `bobyqa` optimizer to improve convergence. To mitigate potential multicollinearity, an optimized model specification excludes variables with high variance inflation factors (VIFs).

To account for unobserved heterogeneity across countries while distinguishing within-country and between-country effects, we employ a Correlated Random Effects Generalized Linear Mixed Model (CRE-GLMM) following the Mundlak (1978) approach. This involves augmenting the random effects logistic regression with group means (country-level averages) of all time-varying covariates. The inclusion of these Mundlak-adjusted variables enables the model to control for potential endogeneity arising from correlations between unobserved country-specific effects and the regressors. The binary dependent variables, capturing the presence or absence of various institutional climate-related actions, are modeled using a logistic link function with random intercepts by country. Robustness diagnostics include multicollinearity checks via VIF and model singularity testing. This specification allows for a clearer interpretation of both short-run institutional dynamics and structural cross-country differences.

4.2.2 Two-step panel quantile regression methodology

This study employs a two-step estimation approach to analyze the heterogeneous effects of financial and macroeconomic factors on investment patterns in green and fossil fuel-related projects.

To account for country-specific fixed effects while preserving the flexibility of quantile regression, this study adopts a two-step approach:

1. Step 1: Fixed-Effects Adjustment (Demeaning). A fixed-effects regression is estimated to remove time-invariant country-specific factors. This transformation yields residuals that capture within-country variation in the dependent variable, free from unobserved fixed effects.

2. Step 2: Quantile Regression on Transformed Data. The de-meaned dependent variable is then used in a quantile regression framework to estimate how financial and macroeconomic factors influence investment decisions at different points in the distribution.

This methodology ensures that the estimated coefficients reflect quantile-specific effects while addressing potential bias from omitted fixed effects[3].

In the first step, we apply within-transformation to control for country-specific fixed effects. The standard fixed-effects panel regression model is given by:

$$y_{it} = \alpha_i + X_{it}\beta + \varepsilon_{it} \tag{2}$$

where y_{it} represents the dependent variable for country i at time t, X_{it} is the vector of independent variables, α_i captures unobserved country-specific fixed effects, and ε_{it} is

[3]Due to the short panel structure of the dataset - comprising 56 countries observed over 5 years each - standard fixed-effects quantile regression approaches are computationally demanding and may yield unreliable estimates. Direct estimation of individual fixed effects within a quantile regression framework (`xtqreg` in Stata) is problematic in short panels due to the limited number of time periods per country. Furthermore, `xtqreg` does not allow for the explicit inclusion of fixed effects, requiring alternative transformations such as first-differencing, which further reduces the number of observations. The two-step approach used in this study mitigates these issues while preserving quantile-specific heterogeneity.

the error term. Since fixed effects can introduce bias in quantile regression estimates, the transformation

$$\tilde{y}_{it} = y_{it} - \hat{\alpha}_i \tag{3}$$

is applied by estimating equation (1) via fixed-effects regression and extracting the residuals $\tilde{y}_{it}$, which represent the within-country de-meaned variation in fossil fuel investment. These residuals are then used as the dependent variable in the quantile regression.

In the second step, quantile regressions are estimated to capture heterogeneous effects across different levels of fossil fuel investment. The conditional quantile function is specified as

$$Q_\tau(\tilde{y}_{it}|X_{it}) = X_{it}\beta_\tau \tag{4}$$

where $Q_\tau(\cdot)$ denotes the conditional quantile function at quantile τ, and β_τ represents the vector of coefficients specific to quantile τ. The quantile regression is estimated at the 25th, 50th, 75th, and 90th percentiles to examine how the effects of financial policies and macroeconomic factors vary across different levels of fossil fuel investment.

Quantile regressions are estimated using the standard optimization problem,

$$\min_{\beta_\tau} \sum_{i,t} \rho_\tau \left(\tilde{y}_{it} - X_{it}\beta_\tau\right) \tag{5}$$

where $\rho_\tau(u) = u(\tau - \mathbb{1}(u < 0))$ is the quantile loss function, which ensures asymmetric weighting of positive and negative residuals.

Each of the indicators in Table 1 is used as a separate dependent variable in the quantile regression analysis, enabling an assessment of the heterogeneous effects of financial and macroeconomic factors on green lending, project-level investment in climate solutions, and high-emission project-level financing.

Indicator	Definition
Project-Level Investment in Climate Solutions	Measures how entities have directly contributed to funding new clean energy projects via direct/primary investment. Investments are categorized by technology (e.g., biofuel/biomass, hydro, solar, wind, waste-to-energy, nuclear, energy storage, carbon capture) and by capital type (debt, equity, other).
Green Lending	Tracks loans and bonds for green projects as defined by Green Loan Principles and Green Bond Principles. Eligible projects include renewable energy plants, energy-efficient buildings, sustainable water management systems, and clean transportation infrastructure.
High-Emission Project-Level Financing	Measures how entities have directly contributed to funding new fossil fuel projects (oil, gas, coal) via direct/primary investment. Investments are categorized by technology (e.g., coal mining, oil-powered production, gas-powered production) and by capital type (debt, equity, other).

Table 1: Definitions of key indicators used as alternative dependent variables in the quantile regression

5 Results

5.1 Effects of climate-related financial policies on institutional climate action

Estimation results are presented in Table 2. A Generalized Linear Mixed Model (GLMM) is estimated to assess the impact of climate-related financial policy strength, macroeconomic factors, and financial market conditions on various aspects of climate finance adoption, policy engagement, and risk management. The model estimates the probability of financial institutions taking climate-related actions, accounting for country-level variations using random effects.

The dependent variables capture different dimensions of institutional climate finance behavior, including the adoption of climate finance targets (*adoption_climate_finance_target*), mitigation targets (*adoption_mitigation_target*), and divestment targets (*adoption_divestment_target*). Additionally, the estimation includes policy implementation (*implementation_score*), policy engagement (*policy_engagement*), climate risk strategy (*climate_risk_strategy*), climate risk management (*climate_risk_management*), and climate risk disclosure (*disclosure_of_climate_risk*).

The results indicate that climate-related financial policy strength (*cumxbind*) consistently has a positive and statistically significant effect on all dependent variables. This suggests that stronger regulatory frameworks increase the likelihood of financial institutions adopting climate finance targets, engaging with risk disclosure, and integrating climate risk management into their decision-making. While the effect sizes are relatively small, they demonstrate that

Dependent Variable	Variable	Estimate	Std. Error	Z-value
adoption_climate_finance_target	(Intercept)	-12.16***	0.00	-5563.53
	cumxbind	0.01***	0.00	3.92
	log(co2em)	-0.62***	0.00	-292.53
	infl	0.02***	0.00	7.49
	log(stocks)	2.51***	0.00	1188.22
	cred	0.02***	0.00	7.92
	unempl	-0.16***	0.00	-73.79
adoption_mitigation_target	(Intercept)	14.77**	5.52	2.68
	cumxbind	0.03***	0.00	14.46
	log(co2em)	-0.80**	0.30	-2.68
	infl	0.33***	0.04	7.83
	log(stocks)	0.31*	0.17	1.77
	cred	-0.02***	0.01	-3.04
	unempl	-0.24***	0.08	-2.89
adoption_divestment_target	(Intercept)	3.46	3.14	1.10
	cumxbind	0.01***	0.00	9.22
	log(co2em)	-0.17	0.18	-0.94
	infl	0.11***	0.03	3.23
	log(stocks)	0.13	0.11	1.13
	cred	-0.02***	0.01	-3.23
	unempl	-0.12**	0.06	-2.08
implementation_score	(Intercept)	3.53	2.95	1.20
	cumxbind	0.01***	0.00	6.55
	log(co2em)	-0.09	0.17	-0.52
	infl	0.18***	0.04	4.46
	log(stocks)	0.11	0.12	0.86
	cred	-0.01*	0.01	-1.75
	unempl	-0.14***	0.05	-3.06
policy_engagement	(Intercept)	2.33	2.90	0.80
	cumxbind	0.01***	0.00	6.29
	log(co2em)	-0.01	0.16	-0.08
	infl	0.10***	0.03	3.04
	log(stocks)	0.12	0.12	1.03
	cred	-0.01**	0.01	-1.99
	unempl	-0.17***	0.05	-3.51
climate_risk_strategy	(Intercept)	2.32	2.52	0.92
	cumxbind	0.01***	0.00	6.03
	log(co2em)	-0.17	0.15	-1.15
	infl	0.05**	0.03	1.94
	log(stocks)	0.05	0.10	0.50
	cred	0.01*	0.00	1.85
	unempl	-0.10**	0.05	-2.15
climate_risk_management	(Intercept)	1.29	2.82	0.46
	cumxbind	0.00***	0.00	5.17
	log(co2em)	-0.08	0.16	-0.51
	infl	0.03	0.03	1.10
	log(stocks)	0.03	0.10	0.28
	cred	0.01	0.00	1.25
	unempl	-0.15***	0.05	-2.67
disclosure_of_climate_risk	(Intercept)	7.48**	3.37	2.22
	cumxbind	0.02***	0.00	11.71
	log(co2em)	-0.49**	0.19	-2.59
	infl	0.17***	0.03	5.09
	log(stocks)	0.20	0.13	1.51
	cred	0.00	0.01	0.48
	unempl	-0.09*	0.05	-1.87
Significance levels: *** p<0.01, ** p<0.05, * p<0.1				

Table 2: Impact of Climate-Related Financial Policy on Institutional Climate Action: GLMM Estimation Results

even incremental policy strengthening can influence institutional behavior. The relationship remains robust across all models, reinforcing the critical role of regulatory frameworks in shaping climate finance commitments.

The results for *log(co2em)*, which captures the log-transformed CO_2 emissions, indicate mixed effects across different climate finance dimensions. While emissions have a negative and significant effect on the likelihood of adopting mitigation targets and climate risk disclosure, their effect on other dependent variables, such as divestment targets, implementation scores, and policy engagement, is either weak or statistically insignificant. This suggests that carbon-intensive economies are not necessarily more proactive in setting climate finance commitments. The findings imply that financial institutions may respond more to regulatory and economic incentives rather than direct environmental pressures alone.

Inflation (*infl*) emerges as a significant predictor in multiple models, with a positive and statistically significant effect on climate finance adoption, policy engagement, and disclosure of climate risks. This finding suggests that financial institutions may perceive climate finance as a hedge against inflation risks or that inflationary pressures incentivize regulatory intervention and financial sector adaptation.

Credit to GDP (*cred*) exhibits varying effects across the models. While it has a positive effect on climate finance adoption, particularly for climate finance targets, it negatively influences the likelihood of institutions adopting mitigation and divestment targets. This suggests that economies with greater credit market development may prioritize financial stability over divestment from high-emission assets. Moreover, its effect on climate risk management and policy engagement is weak but negative, implying that increased credit availability does not necessarily translate into greater institutional commitment to climate-related financial policies.

Unemployment (*unempl*) consistently shows a negative and statistically significant relationship with climate finance adoption, risk disclosure, and engagement. This indicates that higher unemployment levels reduce the probability of institutions adopting climate-related targets or engaging in policy discussions. The findings suggest that financial institutions operating in economies with higher unemployment may prioritize short-term economic stability over long-term climate commitments. The negative impact on policy engagement and climate risk management further highlights the potential trade-offs between economic distress and proactive climate finance strategies.

Stock market size (*log(stocks)*) has a positive but variable effect across different dependent variables. The effect is strongest for climate finance adoption, particularly in influencing the disclosure of climate-related risks. This suggests that larger and more developed financial markets tend to exhibit greater transparency and are more likely to integrate climate considerations into financial reporting. However, its impact on divestment targets and policy engagement is less consistent, indicating that while market size facilitates disclosure, it does not necessarily drive active policy commitments.

While climate-related financial policy strength remains a strong determinant of climate finance adoption, its effect on implementation (*implementation_score*) and policy engagement (*policy_engagement*) is more limited. This suggests that strong policy frameworks alone may not be sufficient to drive effective climate finance execution without complementary enforcement mechanisms. Similarly, while financial institutions may commit to climate finance goals, ensuring actual implementation and sustained policy engagement may require additional incentives, regulatory enforcement, or institutional capacity-building.

The results further confirm the role of regulatory strength in shaping institutional climate risk strategies (*climate_risk_strategy*) and risk management (*climate_risk_management*). However, the relatively small effect sizes indicate that while financial institutions acknowledge climate risk, they may not fully integrate it into decision-making without further regulatory and market-based incentives. The findings on climate risk disclosure (*disclosure_of_climate_risk*) reinforce this conclusion, showing that while disclosure practices improve with stronger regulations, they remain influenced by broader financial market conditions.

5.2 Marginal effects of climate-related financial policies

Figure 3 reports the results of the analysis of the impact of climate-related financial policies on various dependent variables, including the adoption of climate finance targets, divestment targets, mitigation targets, climate risk management, climate risk strategy, disclosure of climate risks, implementation scores, and policy engagement. The marginal effects plots illustrate the relationship between the cumulative intensity of climate-related financial policies and the probability of financial institutions adopting or engaging in these actions. Each plot represents the estimated probability of a given dependent variable, taking a positive value as a function of the strength of climate policies.

The marginal effects plot for the adoption of climate finance targets demonstrates a clear positive relationship between policy strength and the likelihood of setting such targets. As regulatory pressure increases, institutions are more inclined to commit to implementing climate finance objectives into strategic decision-making. The increasing probability observed in the graph suggests that policy intensity plays a key role in accelerating financial commitments toward climate-related initiatives.

A similar pattern is observed in the adoption of divestment targets. The probability of financial institutions committing to divestment strategies rises as climate-related financial policy stringency increases. However, the rate of adoption appears slightly lower compared to climate finance targets. This suggests that while regulatory policies encourage divestment, economic considerations, such as the financial viability of divesting from high-carbon assets, may slow the process. Nevertheless, the positive trend indicates that stronger policies facilitate the gradual reallocation of investments away from fossil fuels and high-emission industries.

The adoption of mitigation targets exhibits one of the strongest increases in probability as policy strength intensifies. This suggests that climate-related financial policies are particularly effective in promoting mitigation actions among financial institutions. The steep slope of the relationship implies that regulatory intervention has a direct and substantial effect on financial institutions' willingness to integrate mitigation targets into their operational and investment strategies. These results highlight the role of well-designed policies in catalyzing institutional action toward emissions reduction and sustainability efforts.

Regarding climate risk management, the marginal effects analysis indicates a moderate but positive increase in probability as climate-related policy strength grows. This suggests that financial institutions are gradually incorporating climate risk into their risk management frameworks in response to regulatory requirements. However, the moderate slope implies that while policy pressure is effective, institutional challenges such as data limitations, compliance costs, and uncertainty over climate risk methodologies may prevent a rapid transition toward comprehensive risk integration.

The probability of adopting a formal climate risk strategy increases as policy strength rises, though at a lower rate compared to risk management. This suggests that while financial institutions recognize the importance of climate risk strategies, their implementation requires long-term structural adjustments, organizational coordination, and alignment with corporate investment frameworks. Unlike direct mitigation or disclosure actions, the formulation of a risk strategy often necessitates internal capacity-building and forward-looking risk assessment methodologies.

The marginal effects plot for the disclosure of climate risks reveals one of the strongest policy-driven responses among all dependent variables. The sharp increase in probability suggests that disclosure mandates are particularly effective in shaping institutional behavior. This aligns with expectations, as regulatory disclosure requirements are often the first step in broader climate risk integration. Compared to mitigation or divestment, disclosure is easier to implement and does not require major structural shifts, making it an accessible compliance measure for financial institutions.

The implementation score follows a consistently increasing trend, indicating that stronger policies are associated with the more widespread adoption of climate-related financial practices. The observed pattern suggests that policy strength facilitates implementation through compliance incentives, regulatory monitoring, and institutional alignment with policy expectations. This underscores the importance of well-structured policies that provide clear guidelines and enforcement mechanisms.

Finally, the analysis of policy engagement shows a moderate positive relationship between policy strength and engagement levels. The probability of engagement increases as climate-related policies become more stringent, but the rate of increase is lower compared to mitigation targets or disclosure. This suggests that while regulations encourage financial institutions to participate in climate finance discussions, additional drivers - such as stakeholder expectations, financial market incentives, and voluntary commitments - also influence engagement levels.

The overall findings confirm that climate-related financial policies play a significant role in shaping financial institutions' behavior. The magnitude of the policy effect varies across dependent variables, with disclosure and implementation showing the strongest response to policy intensity, while climate risk strategy and policy engagement exhibit a more gradual increase. These differences highlight the complexity of policy impact and suggest that while regulations are effective, complementary measures - such as financial incentives, enforcement mechanisms, and institutional capacity-building - may further enhance climate-related financial action.

5.3 Heterogeneous responses across financial entities

While cumulative binding commitments play a role in shaping financial institutions' climate strategies, their impact is not uniform across institutional types. Differences in investment horizons, regulatory exposure, and risk management priorities influence how institutions engage with climate-related financial policies. These commitments affect various dimensions

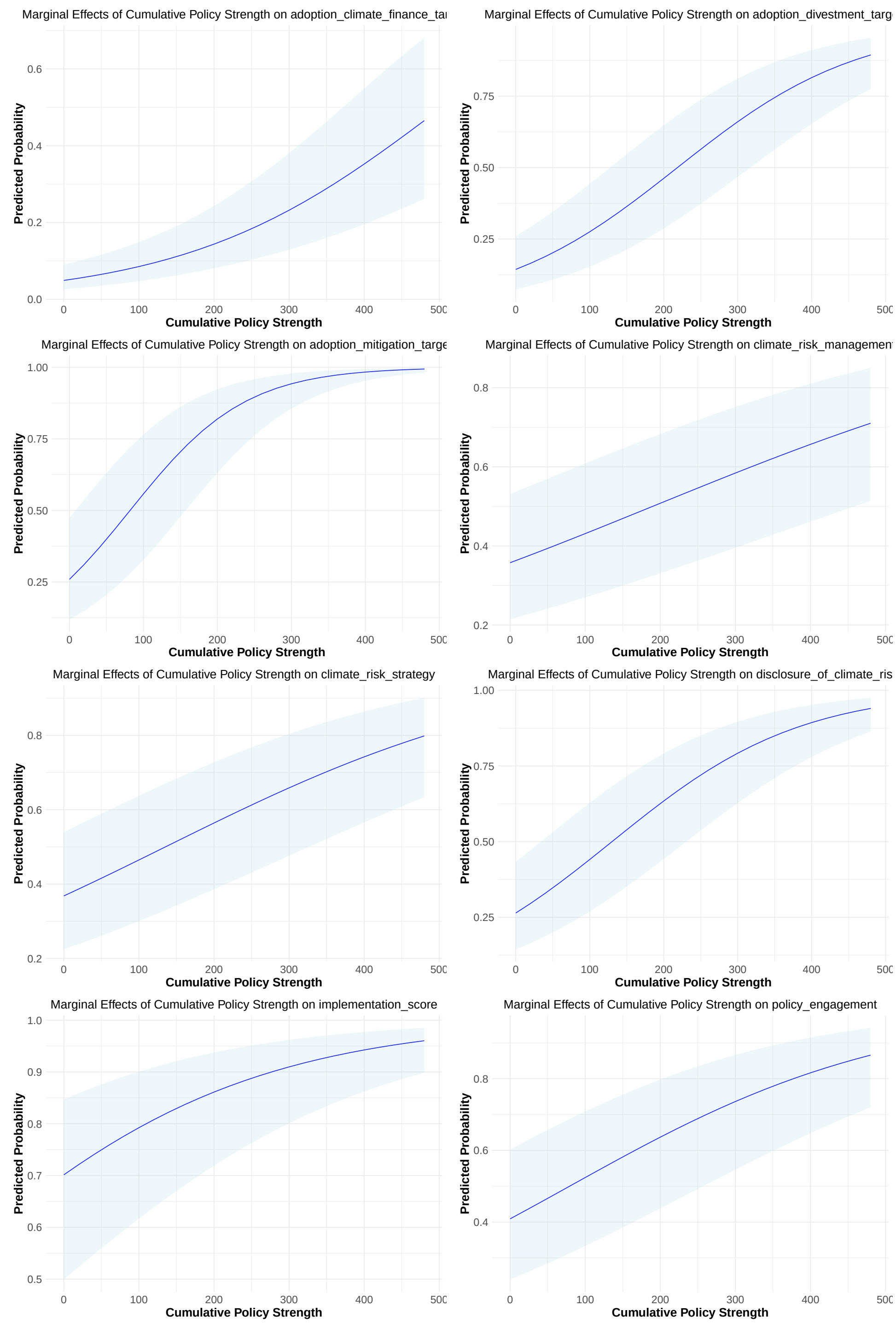

Figure 3: **Marginal effects of Climate-Related Financial Policies (CRFP) on various financial and risk-related adoption measures.** Each panel represents a different dependent variable, showing how increasing policy intensity affects the likelihood of financial institutions adopting climate finance targets, divestment strategies, mitigation targets, risk management practices, risk strategies, climate risk disclosure, implementation scores, and policy engagement. The solid black line represents the predicted probability, while the shaded area denotes the confidence interval.

of financial decision-making, from the adoption of explicit mitigation targets to engagement in climate policy discussions. However, the extent to which commitments translate into substantive climate risk management varies due to sector-specific constraints and incentives. This section examines how different types of financial institutions - asset managers, asset owners, banks, hedge funds, private equity firms, and insurance companies - respond to CRFP and whether these commitments result in meaningful implementation beyond compliance and disclosure. The full regression results for each financial entity type are presented in Appendix A Tables 7, 8, 9, 10, 11, showing the differential impact of CRFP across institutional categories.

The GLMM results show significant variation in how financial institutions respond to cumulative binding commitments (Table 3). Asset managers and banks exhibit strong responsiveness to climate finance targets and mitigation targets, while divestment targets and climate risk management appear to receive weaker responses across most institution types.

Financial Entity	Strongest Response	Weakest Response
Asset Managers	Climate finance targets, mitigation targets, policy engagement	Climate risk management
Asset Owners (Pension Funds, SWFs)	Divestment targets, implementation scores	Climate risk management
Banks	Climate finance targets, mitigation targets	Divestment targets, policy engagement
Hedge Funds & Private Equity	Policy engagement, mitigation target adoption	Climate risk management
Insurers	Policy engagement, mitigation targets	Climate risk management

Table 3: Overview of the strongest and weakest effects of cumulative binding commitments by financial entity

Cumulative binding commitments have a positive effect on climate-related financial policies across all institution types. The strongest effects are observed in the adoption of mitigation targets, climate finance targets, and policy engagement, while the weakest effects appear in the implementation of climate policies and climate risk management strategies. These findings suggest that binding commitments encourage financial institutions to set climate goals and participate in regulatory discussions but are less effective in ensuring that climate risks are fully integrated into financial decision-making. Institutions are more likely to respond to binding commitments by engaging in external climate-related policies and increasing transparency through disclosures rather than by strengthening internal risk management frameworks. Public commitments to climate targets take precedence over fundamental changes in financial risk assessment, as reflected in the weaker relationship between cumulative binding commitments and climate risk management outcomes. These results indicate that while regulatory commitments encourage engagement, additional measures may be required to support the full internalization of climate risks. Asset managers exhibit strong responsiveness to cumulative binding commitments, particularly in the adoption of mitigation targets, climate finance targets, and policy engagement. Their role in capital allocation makes them more likely to align with climate finance policies and publicly commit to climate-related financial targets. However, their lower responsiveness in climate risk management suggests that these commitments do not necessarily lead to the development of internal methodologies for assessing climate risks. Asset owners, including pension and sovereign wealth funds, are highly responsive to divestment targets, policy engagement, and implementation scores. Their stronger relationship with implementation scores suggests that they adopt climate-related targets and incorporate them into financial decision-making. However, their lower responsiveness in climate risk management suggests that commitments do not consistently translate into the internalization of climate risks. Banks respond notably to mitigation and climate finance targets but exhibit weaker effects on divestment targets and policy engagement. This indicates that while banks direct capital toward climate-related finance, they are less likely to reduce exposure to high-emission assets. The weaker policy engagement response suggests that banks tend to follow regulatory requirements rather than actively shaping climate-related financial discussions. Furthermore, the weaker impact on implementation scores implies that commitments to climate finance targets do not necessarily result in full integration into lending and credit allocation decisions. Hedge funds and private equity firms show the highest responsiveness in policy engagement and mitigation target adoption but weaker effects in climate risk management. Their active participation in policy discussions aligns with broader involvement in financial regulation. However, the weaker relationship with climate risk management suggests that their engagement in climate-related commitments does not necessarily lead to systematic risk integration. Insurance firms are highly responsive to mitigation targets and policy engagement but display the weakest response in climate risk management. Although insurers are directly exposed to climate risks through underwriting activities, their lower responsiveness to cumulative binding commitments in climate risk management suggests that existing regulatory frameworks already require significant climate risk assessment. This may explain why additional binding commitments do not appear to have a significant impact on their climate risk strategies. Nevertheless, their strong engagement in policy discussions highlights their recognition of the importance of shaping climate-related financial regulations. These findings indicate that while cumulative binding commitments shape financial institutions' climate-related policies, additional mechanisms may be required to strengthen climate risk integration. Regulatory reporting requirements, financial incentives, and enhanced supervisory oversight could complement binding commitments and support a more comprehensive approach to climate risk management across financial sectors.

5.4 Robustness checks: Correlated Random Effects (Mundlak) Estimation

To evaluate the robustness of the main findings and address concerns related to unobserved heterogeneity and potential endogeneity, we implement a correlated random effects model using the Mundlak approach (CRE-GLMM). This specification extends the baseline GLMM framework by including group-level means of time-varying covariates, which capture persistent country-specific characteristics that may correlate with both the independent variables and the unobserved effects. This correction allows the model to disentangle within-country (time-varying) dynamics from between-country structural differences, thereby improving the credibility of causal interpretations.

The results, presented in Table 12 in Appendix B, reveal that the core findings from the baseline specification remain largely robust. The estimated effect of the cumulative climate-related financial policy index (`cumxbind`) continues to be positive and statistically significant across the majority of outcomes, underscoring the relevance of sustained policy engagement in shaping institutional behavior. In contrast, several of the group-level mean variables, most notably `mean unempl`, `mean stocks`, and `mean cumxbind`, emerge as statistically significant in multiple models, pointing to the salience of country-level economic structure and long-term policy exposure in explaining heterogeneity in climate-related action.

Compared to the standard GLMM results, the CRE-GLMM model provides additional granularity and confirms that both the intensity and consistency of national policy environments matter for institutional responses. The observed differences in coefficient magnitudes and statistical significance across models highlight the importance of accounting for cross-sectional dependence and the dual role of time-varying shocks and structural conditions.

5.5 Robustness checks: Bayesian estimation and convergence diagnostics

To further complement the GLMM estimates, a Bayesian logistic regression model is implemented, introducing a probabilistic framework for parameter estimation. The results of the Bayesian logistic regression, presented in Table 13 in Appendix C, serve as robustness checks for the GLMM estimates. These findings confirm the key results while providing a probabilistic interpretation of the effects of climate-related financial policies, macroeconomic factors, and financial market conditions. The posterior distributions of the Bayesian estimates reinforce the conclusion that stronger regulatory frameworks, captured by the *cumxbind* variable, increase the likelihood of climate finance adoption, risk disclosure, and policy engagement. The consistency of significance across models validates the robustness of the relationship between regulatory strength and institutional climate finance decisions. However, the relatively modest effect size, as reflected in odds ratios slightly above one, aligns with the GLMM results, indicating that while regulatory measures are significant, their impact remains incremental and is mediated by broader economic and financial conditions.

The role of macroeconomic factors remains stable across estimation approaches. Inflation consistently emerges as a strong predictor of climate finance adoption in GLMM and Bayesian estimations. This supports the interpretation that financial institutions may perceive climate finance as a hedge against inflation risks or that inflationary pressures incentivize regulatory intervention. Similarly, stock market size exhibits a positive but variable effect, particularly in facilitating climate finance adoption, though its influence on broader policy engagement remains limited. The mixed effects of CO_2 emissions across different models further substantiate the GLMM findings, suggesting that direct environmental pressures alone are insufficient to predict climate-related financial commitments. These results support the hypothesis that financial institutions are more responsive to regulatory signals and economic incentives than to emissions-driven pressures alone.

The robustness of the Bayesian estimation is further confirmed through convergence diagnostics. The Gelman-Rubin statistic (Rhat) remains at 1.00 for all estimates, indicating proper convergence of the Markov Chain Monte Carlo (MCMC) sampling process. The effective sample size (n_eff) is also sufficiently large to ensure stable parameter estimation. These diagnostics reinforce confidence in the findings' validity, confirming the GLMM results' robustness while providing an alternative estimation approach that accounts for parameter uncertainty in a probabilistic framework.

The Bayesian robustness checks confirm that regulatory commitment is a key determinant of institutional responses to climate finance policies. However, the modest effect sizes underscore the need for complementary policy measures, such as enforcement mechanisms or market-based incentives, to translate regulatory adoption into meaningful financial sector action. The alignment between the Bayesian and GLMM results suggests that climate finance adoption is shaped by regulatory pressure and economic conditions, highlighting the importance of integrated policy approaches that align climate-related financial policies with broader macroeconomic and financial stability objectives.

5.6 Quantile regression analysis of green lending and investment patterns

We now analyze the determinants of green lending, project-level investment in climate solutions, and project-level investment in fossil fuels across different quantiles.

Table 4 presents the results for green lending. Climate-related financial policies negatively impact green lending at lower quantiles but become insignificant at higher levels. This suggests that stricter policies may initially constrain lending due to compliance costs but have a diminishing effect in markets with well-established green finance sectors. The credit-to-GDP ratio consistently reduces green lending, indicating that financial constraints limit the expansion of green finance. Higher CO2 emissions are associated with lower green lending across all quantiles, suggesting that economies with strong reliance on fossil fuels face greater difficulties transitioning to sustainable finance. Inflation exerts a strong negative effect, particularly at lower quantiles, highlighting the importance of macroeconomic stability in fostering green lending. Stock market performance positively influences green lending, especially at higher quantiles, reflecting that stronger financial markets promote green loans and bonds. Unemployment negatively affects green lending at lower quantiles but turns positive at the highest quantile, suggesting that in economies with high green lending activity, labor market challenges may drive policy interventions aimed at stimulating sustainable finance.

Table 5 reports the results for direct project-level investment in climate solutions. The effect of climate-related financial policies is mixed, with a negative impact at lower quantiles and a positive impact at higher quantiles. This indicates that while financial regulations may initially impose barriers to investment, they eventually facilitate large-scale financing of clean energy projects. The credit-to-GDP ratio negatively affects investment at lower and median quantiles but turns positive at the highest quantile, suggesting that financial constraints limit early-stage climate investment while supporting large-scale projects in more developed markets. CO2 emissions do not significantly impact climate investment, implying that financing decisions are not directly influenced by national emission levels. Inflation has a weak negative effect at higher quantiles, reflecting that macroeconomic stability plays a role in maintaining sustained investment in clean energy. Stock market performance has a weak positive effect at lower quantiles but is insignificant at higher quantiles, suggesting that equity markets do not strongly influence project-level investment in climate solutions. Unemployment has a strong positive effect at lower and upper quantiles, indicating that job losses may trigger public-sector investment in clean energy projects.

Table 6 provides the results for direct project-level investment in fossil fuels. Climate-related financial policies are positively associated with fossil fuel investment across all quantiles, suggesting that existing financial regulations are not sufficiently restrictive to curb fossil fuel financing. The credit-to-GDP ratio consistently reduces fossil fuel investment, implying that increased credit availability does not necessarily lead to greater fossil fuel financing. CO2 emissions positively influence fossil fuel investment at all quantiles, reinforcing the persistence of fossil fuel development in high-emission economies. Inflation has a weak effect, suggesting that fossil fuel investment decisions are less sensitive to macroeconomic fluctuations. Stock market performance negatively affects fossil fuel investment at lower quantiles but turns positive at higher quantiles, indicating that while strong financial markets initially discourage fossil fuel financing, they later facilitate large-scale investments. Unemployment positively influences fossil fuel investment across all quantiles, suggesting that governments may support fossil fuel projects in response to economic and labor market challenges.

Overall, these findings highlight that climate-related financial policies require stronger enforcement to effectively redirect capital flows away from fossil fuel investment. Financial constraints significantly hinder green lending and climate investment but do not appear to deter fossil fuel financing. Economic factors such as stock market performance and unemployment influence green and fossil fuel investment in different ways, with green lending benefiting from strong financial markets and fossil fuel investment increasing during periods of high unemployment.

Dependent Variable: Green Lending				
	Q25	Q50	Q75	Q90
cumxbind	-7.216***	-3.563***	-4.720	0.470
	(0.063)	(1.102)	(3.600)	(8.907)
cred	-6.523***	-6.224***	-6.438	-2.152
	(0.100)	(1.757)	(5.741)	(14.204)
co2em	-0.000***	-0.000***	-0.000***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
infl	-20.932***	-24.866*	-20.281	-14.368
	(0.785)	(13.811)	(45.123)	(111.646)
stocks	15.162***	14.716***	35.355***	31.337
	(0.211)	(3.715)	(12.138)	(30.033)
unempl	-35.868***	-40.644***	-35.597	77.971
	(0.529)	(9.302)	(30.390)	(75.194)
Constant	1,090.481***	1,096.200***	1,070.086*	357.082
	(10.583)	(186.141)	(608.138)	(1,504.704)
Observations	105	105	105	105

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Summary of Panel Quantile Regression Results for Green Lending

Dependent Variable: Direct Project-Level Investment in Climate Solutions				
	Q25	Q50	Q75	Q90
cumxbind	-3.394***	3.663***	3.790	3.857
	(0.479)	(1.263)	(2.290)	(4.958)
cred	-4.860***	-4.024**	-3.084	2.639
	(0.763)	(2.014)	(3.652)	(7.906)
co2em	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
infl	0.018	-8.205	-11.506	-12.746
	(6.000)	(15.831)	(28.702)	(62.138)
stocks	3.177*	2.081	4.160	3.428
	(1.614)	(4.258)	(7.721)	(16.715)
unempl	11.780***	2.238	5.098	125.051***
	(4.041)	(10.662)	(19.331)	(41.850)
Constant	42.710	31.416	-3.643	-739.342
	(80.858)	(213.356)	(386.827)	(837.463)
Observations	105	105	105	105
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.				

Table 5: Panel Quantile Regression Results for Direct Project-Level Investment in Climate Solutions

Dependent Variable: Direct Project-Level Investment in Fossil Fuel				
	Q25	Q50	Q75	Q90
cumxbind	0.256***	4.688***	6.794***	6.056***
	(0.053)	(1.126)	(1.640)	(2.087)
cred	-3.523***	-3.446*	-3.360	-2.284
	(0.085)	(1.795)	(2.615)	(3.329)
co2em	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
infl	4.566***	1.658	-1.092	1.473
	(0.670)	(14.108)	(20.557)	(26.164)
stocks	-5.053***	-4.677	11.236**	14.063**
	(0.180)	(3.795)	(5.530)	(7.038)
unempl	20.103***	16.037*	7.716	17.517
	(0.451)	(9.502)	(13.845)	(17.621)
Constant	-915.970***	-909.700***	-861.583***	-973.516***
	(9.023)	(190.141)	(277.056)	(352.620)
Observations	105	105	105	105
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.				

Table 6: Panel Quantile Regression Results for Direct Project-Level Investment in Fossil Fuel

6 Conclusions

This study examined the influence of climate-related financial policies (CRFPs) on institutional climate action, focusing on both formal commitments and actual investment behavior. The empirical analysis reveals a critical misalignment: while CRFPs effectively promote symbolic engagement, such as climate-related target-setting, policy participation, and risk disclosure, they are not consistently associated with tangible divestment from carbon-intensive assets. This disconnect raises concerns about the credibility and effectiveness of financial sector decarbonization pathways.

The results underscore that macro-financial conditions affect the effectiveness of CRFPs. Persistent inflation, credit constraints, and dependencies on fossil fuel industries are structural barriers limiting financial institutions' responsiveness. Even in economies where climate risks are well acknowledged, these systemic factors hinder the redirection of capital toward sustainable activities. The analysis thus highlights that CRFPs, in their current design, lack the regulatory leverage to induce systemic financial reallocation at the scale and speed required.

To close this implementation gap, policy architecture must evolve beyond disclosure-driven frameworks. Effective CRFP design should integrate enforceable mandates for portfolio alignment, fiscal incentives for sustainable investments, and credible deterrents for continued fossil fuel financing. A coordinated regulatory approach bridging prudential oversight, investment policy, and fiscal levers is essential to realign institutional behavior with broader climate objectives.

The robustness analysis employing the CRE-GLMM approach (Mundlak specification) confirms and extends the baseline findings. By explicitly modeling unobserved country-level heterogeneity, this specification provides clearer differentiation between within-country and between-country effects. The consistently significant role of cumulative policy commitment (`cumxbind`) across all model variants reinforces its centrality in shaping institutional climate action. Moreover, the significance of group-level covariate means it confirms that national economic structures exert a stable influence on institutional behavior. These insights emphasize that observed inconsistencies between commitments and behavior are not transient deviations but rather symptoms of deeper institutional and structural inertia.

Overall, the findings point to the need for climate finance governance frameworks that are both technically sound and aligned with the institutional realities of financial systems. Regulatory interventions must directly confront entrenched frictions, such as misaligned fiduciary incentives, reputational isomorphism, and regulatory arbitrage, perpetuating the commitment-behavior gap. Future research should further explore the dynamic co-evolution of regulation and institutional practice, with greater attention to sectoral heterogeneity and longer-term behavioral adaptation. Only through such integrated and forward-looking approaches can climate-related financial policy become a credible driver of decarbonization in the financial system.

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A Results by financial entity

Dependent_Variable	Variable	Estimate	Std_Error	Z_value
adoption_climate_finance_target	(Intercept)	-12.16***	0.00	-5563.53
	cumxbind	0.01***	0.00	3.92
	log(co2em)	-0.62***	0.00	-292.53
	infl	0.02***	0.00	7.49
	log(stocks)	2.51***	0.00	1188.22
	cred	0.02***	0.00	7.92
	unempl	-0.16***	0.00	-73.79
adoption_mitigation_target	(Intercept)	14.77**	5.52	2.68
	cumxbind	0.03***	0.00	14.46
	log(co2em)	-0.80**	0.30	-2.68
	infl	0.33***	0.04	7.83
	log(stocks)	0.31*	0.17	1.77
	cred	-0.02***	0.01	-3.04
	unempl	-0.24***	0.08	-2.89
adoption_divestment_target	(Intercept)	3.46	3.14	1.10
	cumxbind	0.01***	0.00	9.22
	log(co2em)	-0.17	0.18	-0.94
	infl	0.11***	0.03	3.23
	log(stocks)	0.13	0.11	1.13
	cred	-0.02***	0.01	-3.23
	unempl	-0.12**	0.06	-2.08
implementation_score	(Intercept)	3.53	2.95	1.20
	cumxbind	0.01***	0.00	6.55
	log(co2em)	-0.09	0.17	-0.52
	infl	0.18***	0.04	4.46
	log(stocks)	0.11	0.12	0.86
	cred	-0.01*	0.01	-1.75
	unempl	-0.14***	0.05	-3.06
policy_engagement	(Intercept)	2.33	2.90	0.80
	cumxbind	0.01***	0.00	6.29
	log(co2em)	-0.01	0.16	-0.08
	infl	0.10***	0.03	3.04
	log(stocks)	0.12	0.12	1.03
	cred	-0.01**	0.01	-1.99
	unempl	-0.17***	0.05	-3.51
climate_risk_strategy	(Intercept)	2.32	2.52	0.92
	cumxbind	0.01***	0.00	6.03
	log(co2em)	-0.17	0.15	-1.15
	infl	0.05**	0.03	1.94
	log(stocks)	0.05	0.10	0.50
	cred	0.01*	0.00	1.85
	unempl	-0.10**	0.05	-2.15
climate_risk_management	(Intercept)	1.29	2.82	0.46
	cumxbind	0.00***	0.00	5.17
	log(co2em)	-0.08	0.16	-0.51
	infl	0.03	0.03	1.10
	log(stocks)	0.03	0.10	0.28
	cred	0.01	0.00	1.25
	unempl	-0.15***	0.05	-2.67
disclosure_of_climate_risk	(Intercept)	7.48**	3.37	2.22
	cumxbind	0.02***	0.00	11.71
	log(co2em)	-0.49**	0.19	-2.59
	infl	0.17***	0.03	5.09
	log(stocks)	0.20	0.13	1.51
	cred	0.00	0.01	0.48
	unempl	-0.09*	0.05	-1.87
Significance levels: *** p<0.01, ** p<0.05, * p<0.1				

Table 7: Impact of CRFP on asset managers climate-related action: estimation results.

Dependent_Variable	Variable	Estimate	Std_Error	Z_value
adoption_climate_finance_target	(Intercept)	1.49***	0.00	1298.51
	cumxbind	0.01***	0.00	10.46
	log(co2em)	-0.34***	0.00	-291.79
	infl	0.03***	0.00	26.71
	log(stocks)	-0.22***	0.00	-182.84
	cred	0.01***	0.00	11.30
	unempl	0.01***	0.00	7.77
adoption_mitigation_target	(Intercept)	8.70	10.97	0.79
	cumxbind	0.01***	0.00	7.35
	log(co2em)	-0.52	0.53	-0.97
	infl	0.03	0.03	1.31
	log(stocks)	-0.39	0.26	-1.50
	cred	-0.00	0.01	-0.16
	unempl	-0.18	0.16	-1.17
adoption_divestment_target	(Intercept)	2.48	4.73	0.52
	cumxbind	0.01***	0.00	6.41
	log(co2em)	-0.38	0.25	-1.49
	infl	0.05**	0.02	2.10
	log(stocks)	-0.18	0.22	-0.81
	cred	0.02***	0.01	3.02
	unempl	-0.05	0.09	-0.55
implementation_score	(Intercept)	-6.40	5.58	-1.15
	cumxbind	0.00***	0.00	4.40
	log(co2em)	0.24	0.30	0.80
	infl	0.03	0.02	1.32
	log(stocks)	-0.09	0.16	-0.57
	cred	0.01**	0.01	2.08
	unempl	-0.14	0.09	-1.46
policy_engagement	(Intercept)	-4.28	4.54	-0.94
	cumxbind	0.00***	0.00	4.52
	log(co2em)	0.08	0.25	0.31
	infl	0.03	0.02	1.42
	log(stocks)	-0.29*	0.17	-1.72
	cred	0.02***	0.01	2.84
	unempl	-0.02	0.08	-0.25
climate_risk_strategy	(Intercept)	-1.50	4.75	-0.32
	cumxbind	0.00***	0.00	3.79
	log(co2em)	-0.11	0.26	-0.44
	infl	0.03	0.02	1.22
	log(stocks)	-0.09	0.19	-0.50
	cred	0.02**	0.01	2.49
	unempl	-0.05	0.09	-0.50
climate_risk_management	(Intercept)	0.85	6.20	0.14
	cumxbind	0.00**	0.00	2.57
	log(co2em)	-0.23	0.33	-0.69
	infl	0.02	0.02	1.07
	log(stocks)	-0.08	0.21	-0.39
	cred	0.02**	0.01	2.07
	unempl	-0.12	0.11	-1.09
disclosure_of_climate_risk	(Intercept)	3.54	6.16	0.57
	cumxbind	0.00***	0.00	4.77
	log(co2em)	-0.46	0.33	-1.39
	infl	0.03	0.02	1.32
	log(stocks)	-0.02	0.22	-0.10
	cred	0.02***	0.01	2.94
	unempl	-0.12	0.11	-1.06

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Table 8: Impact of CRFP on asset owners climate-related action: estimation results.

Dependent_Variable	Variable	Estimate	Std_Error	Z_value
adoption_climate_finance_target	(Intercept)	-13.77***	3.07	-4.49
	cumxbind	0.01***	0.00	3.41
	log(co2em)	0.43**	0.16	2.70
	infl	0.01	0.04	0.25
	log(stocks)	0.57*	0.30	1.91
	cred	0.01	0.01	1.24
	unempl	0.02	0.07	0.36
adoption_mitigation_target	(Intercept)	4.72	3.24	1.46
	cumxbind	0.01***	0.00	4.58
	log(co2em)	-0.20	0.18	-1.08
	infl	0.11**	0.04	2.74
	log(stocks)	0.16	0.14	1.16
	cred	-0.01	0.01	-1.61
	unempl	0.03	0.08	0.45
adoption_divestment_target	(Intercept)	-6.32	4.45	-1.42
	cumxbind	0.00**	0.00	2.34
	log(co2em)	0.25	0.24	1.03
	infl	0.03	0.03	0.92
	log(stocks)	0.24	0.19	1.25
	cred	-0.00	0.01	-0.22
	unempl	-0.06	0.08	-0.75
implementation_score	(Intercept)	6.62	4.24	1.56
	cumxbind	0.01***	0.00	3.42
	log(co2em)	-0.28	0.24	-1.14
	infl	0.15**	0.06	2.45
	log(stocks)	0.29	0.19	1.57
	cred	-0.01	0.01	-0.86
	unempl	0.03	0.10	0.27
policy_engagement	(Intercept)	-4.26	4.52	-0.94
	cumxbind	0.00**	0.00	2.34
	log(co2em)	0.10	0.25	0.41
	infl	0.04	0.03	1.24
	log(stocks)	0.25*	0.15	1.72
	cred	0.00	0.01	0.53
	unempl	0.07	0.09	0.81
climate_risk_strategy	(Intercept)	-2.62	4.12	-0.64
	cumxbind	0.01***	0.00	3.53
	log(co2em)	0.01	0.23	0.06
	infl	0.03	0.03	1.17
	log(stocks)	0.25*	0.14	1.79
	cred	0.01	0.01	1.06
	unempl	0.11	0.09	1.32
climate_risk_management	(Intercept)	-2.73	4.22	-0.65
	cumxbind	0.01***	0.00	3.67
	log(co2em)	0.00	0.23	0.02
	infl	0.03	0.03	1.07
	log(stocks)	0.34**	0.16	2.10
	cred	0.01	0.01	0.82
	unempl	0.12	0.09	1.36
disclosure_of_climate_risk	(Intercept)	1.93	3.47	0.55
	cumxbind	0.01***	0.00	5.46
	log(co2em)	-0.15	0.19	-0.76
	infl	0.09***	0.03	3.00
	log(stocks)	0.22*	0.12	1.77
	cred	-0.00	0.01	-0.06
	unempl	-0.14*	0.08	-1.88
Significance levels: *** p<0.01, ** p<0.05, * p<0.1				

Table 9: Impact of CRFP on banks' climate-related action: estimation results.

Dependent_Variable	Variable	Estimate	Std_Error	Z_value
adoption_mitigation_target	(Intercept)	13.44***	0.00	3194.69
	cumxbind	0.02***	0.00	9.38
	log(co2em)	-0.70***	0.00	-166.78
	infl	0.13***	0.00	30.75
	log(stocks)	0.95***	0.00	225.72
	cred	-0.02***	0.00	-6.34
	unempl	-0.66***	0.00	-156.33
adoption_divestment_target	(Intercept)	7.33	8.49	0.86
	cumxbind	0.01***	0.00	4.51
	log(co2em)	-0.30	0.40	-0.73
	infl	-0.05	0.05	-0.95
	log(stocks)	0.23	0.66	0.35
	cred	-0.01	0.02	-0.98
	unempl	-0.60**	0.28	-2.14
implementation_score	(Intercept)	16.62	10.30	1.61
	cumxbind	0.02***	0.00	4.53
	log(co2em)	-0.73	0.51	-1.42
	infl	0.05	0.10	0.56
	log(stocks)	1.79**	0.81	2.21
	cred	-0.03	0.02	-1.79
	unempl	-0.87***	0.25	-3.49
policy_engagement	(Intercept)	13.65***	0.00	6483.52
	cumxbind	0.02***	0.00	9.34
	log(co2em)	-0.62***	0.00	-291.78
	infl	0.07***	0.00	31.61
	log(stocks)	0.62***	0.00	291.88
	cred	-0.01***	0.00	-6.44
	unempl	-0.47***	0.00	-216.70
climate_risk_strategy	(Intercept)	8.78	5.18	1.69
	cumxbind	0.00**	0.00	2.32
	log(co2em)	-0.57**	0.27	-2.13
	infl	0.02	0.05	0.51
	log(stocks)	0.48	0.50	0.97
	cred	0.01	0.01	0.80
	unempl	-0.20	0.14	-1.35
climate_risk_management	(Intercept)	7.70	5.41	1.42
	cumxbind	0.00	0.00	1.50
	log(co2em)	-0.48	0.28	-1.73
	infl	-0.01	0.04	-0.18
	log(stocks)	0.43	0.50	0.86
	cred	0.00	0.01	0.37
	unempl	-0.20	0.15	-1.34
disclosure_of_climate_risk	(Intercept)	8.11***	0.01	1148.53
	cumxbind	0.02***	0.00	7.77
	log(co2em)	-0.48***	0.01	-69.42
	infl	0.09***	0.01	12.83
	log(stocks)	1.33***	0.01	193.60
	cred	-0.02***	0.00	-5.26
	unempl	-0.61***	0.01	-86.46
Significance levels: *** p<0.01, ** p<0.05, * p<0.1				

Table 10: Impact of CRFP on private equity, venture capital, and hedge funds' climate-related action: estimation results.

Dependent_Variable	Variable	Estimate	Std_Error	Z_value
adoption_climate_finance_target	(Intercept)	0.19	4.51	0.04
	cumxbind	0.01***	0.00	2.90
	log(co2em)	-0.26	0.25	-1.04
	infl	0.30***	0.07	4.23
	log(stocks)	0.52*	0.28	1.87
	cred	0.00	0.01	0.00
	unempl	0.03	0.05	0.67
adoption_mitigation_target	(Intercept)	1.83	4.97	0.37
	cumxbind	0.02***	0.00	5.97
	log(co2em)	-0.22	0.28	-0.77
	infl	0.34***	0.08	4.05
	log(stocks)	0.74***	0.25	2.99
	cred	-0.02*	0.01	-1.77
	unempl	-0.06	0.06	-0.97
adoption_divestment_target	(Intercept)	3.02	6.22	0.49
	cumxbind	0.01***	0.00	3.91
	log(co2em)	-0.35	0.35	-1.02
	infl	0.17**	0.07	2.56
	log(stocks)	0.36	0.28	1.28
	cred	0.01	0.01	0.70
	unempl	0.00	0.07	0.03
implementation_score	(Intercept)	3.29	4.96	0.66
	cumxbind	0.01***	0.00	2.59
	log(co2em)	-0.19	0.28	-0.65
	infl	0.24***	0.08	2.83
	log(stocks)	0.57***	0.21	2.70
	cred	-0.01	0.01	-1.14
	unempl	-0.02	0.07	-0.24
policy_engagement	(Intercept)	4.37***	0.77	5.71
	cumxbind	0.01***	0.00	5.58
	log(co2em)	-0.30***	0.00	-116.92
	infl	0.27***	0.08	3.45
	log(stocks)	0.49***	0.18	2.71
	cred	-0.01***	0.00	-3.80
	unempl	0.04***	0.00	16.33
climate_risk_strategy	(Intercept)	2.29	6.04	0.38
	cumxbind	0.01**	0.00	2.19
	log(co2em)	-0.24	0.34	-0.70
	infl	0.03	0.05	0.64
	log(stocks)	0.51*	0.27	1.89
	cred	0.00	0.01	0.19
	unempl	0.00	0.07	0.05
climate_risk_management	(Intercept)	1.21	7.13	0.17
	cumxbind	0.00	0.00	1.26
	log(co2em)	-0.11	0.39	-0.29
	infl	0.02	0.05	0.32
	log(stocks)	0.55*	0.30	1.79
	cred	-0.00	0.01	-0.21
	unempl	-0.18*	0.11	-1.64
disclosure_of_climate_risk	(Intercept)	1.15***	0.00	251.17
	cumxbind	0.01***	0.00	4.24
	log(co2em)	-0.11***	0.00	-23.23
	infl	0.11***	0.00	23.29
	log(stocks)	0.69***	0.00	150.92
	cred	-0.01***	0.00	-3.33
	unempl	-0.22***	0.00	-48.14
Significance levels: *** p<0.01, ** p<0.05, * p<0.1				

Table 11: Impact of CRFP on insurance companies climate-related action: estimation results.

B CRE Estimation

Table 12: CRE-GLMM Results

Dependent Variable	Variable	Estimate	Std. Error	Z-value
adoption_climate_finance_target	(Intercept)	-2.67***	0.24	-11.17
	cumxbind	0.76***	0.12	6.27
	annualco22	-0.5	1.40	-0.36
	infl	0.15**	0.06	2.58
	stocks	-0.09	0.10	-0.84
	credgdp	0.53*	0.24	2.19
	unempl	-0.35	0.22	-1.60
	mean_cumxbind	-0.67	0.37	-1.81
	mean_annualco22	0.53	1.43	0.37
	mean_infl	-0.54	0.38	-1.43
	mean_stocks	0.64*	0.28	2.26
	mean_credgdp	-0.23	0.34	-0.69
	mean_unempl	0.59*	0.23	2.51
adoption_mitigation_target	(Intercept)	0.26	0.27	0.98
	cumxbind	1.51***	0.08	17.96
	annualco22	-0.96	0.81	-1.18
	infl	0.15***	0.04	3.71
	stocks	-0.19*	0.07	-2.54
	credgdp	-0.2	0.18	-1.16
	unempl	-0.93***	0.15	-6.21
	mean_cumxbind	-1.05*	0.43	-2.45
	mean_annualco22	1.15	0.89	1.29
	mean_infl	-0.74*	0.35	-2.09
	mean_stocks	0.09	0.27	0.31
	mean_credgdp	0.22	0.29	0.76
	mean_unempl	1.08***	0.19	5.84
adoption_divestment_target	(Intercept)	-1.21***	0.22	-5.40
	cumxbind	0.96***	0.08	12.29
	annualco22	-1.24	0.87	-1.42
	infl	0.08	0.04	1.88
	stocks	-0.18**	0.07	-2.61
	credgdp	-0.09	0.18	-0.47
	unempl	-0.65***	0.15	-4.30
	mean_cumxbind	-0.94**	0.35	-2.70
	mean_annualco22	1.41	0.92	1.53
	mean_infl	-0.48	0.32	-1.51
	mean_stocks	0.57*	0.23	2.45
	mean_credgdp	0.14	0.27	0.53
	mean_unempl	0.84***	0.17	4.82
implementation_score	(Intercept)	1.15***	0.31	3.72
	cumxbind	0.55***	0.07	7.81

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Table 12 – *continued from previous page*

Dependent Variable	Variable	Estimate	Std. Error	Z-value
	annualco22	-1.41	1.01	-1.40
	infl	0.09*	0.04	2.14
	stocks	-0.03	0.06	-0.48
	credgdp	-0.08	0.17	-0.45
	unempl	-0.71***	0.15	-4.60
	mean_cumxbind	-0.32	0.49	-0.65
	mean_annualco22	1.59	1.10	1.45
	mean_infl	-0.58	0.39	-1.49
	mean_stocks	-0.04	0.31	-0.14
	mean_credgdp	0.39	0.32	1.24
	mean_unempl	0.81***	0.20	4.06
policy_engagement	(Intercept)	-0.21	0.29	-0.72
	cumxbind	0.52***	0.07	8.03
	annualco22	-0.89	0.90	-0.99
	infl	0.07	0.04	1.90
	stocks	-0.08	0.06	-1.28
	credgdp	0.01	0.17	0.05
	unempl	-0.52***	0.14	-3.66
	mean_cumxbind	-0.64	0.45	-1.42
	mean_annualco22	1	0.98	1.02
	mean_infl	-0.2	0.37	-0.54
	mean_stocks	0.45	0.29	1.56
	mean_credgdp	0.51	0.30	1.71
	mean_unempl	0.7***	0.18	3.91
climate_risk_strategy	(Intercept)	-0.29	0.30	-0.97
	cumxbind	0.46***	0.06	7.30
	annualco22	-1.03	0.82	-1.25
	infl	0.1**	0.04	2.64
	stocks	-0.13*	0.07	-1.97
	credgdp	0.38*	0.17	2.28
	unempl	0	0.14	0.01
	mean_cumxbind	-0.5	0.47	-1.07
	mean_annualco22	1.26	0.92	1.36
	mean_infl	-0.5	0.39	-1.28
	mean_stocks	0.58	0.30	1.90
	mean_credgdp	-0.08	0.30	-0.26
	mean_unempl	0.03	0.18	0.16
climate_risk_management	(Intercept)	-0.39	0.30	-1.27
	cumxbind	0.35***	0.06	5.62
	annualco22	-0.68	0.79	-0.86
	infl	0.07	0.04	1.88
	stocks	-0.11	0.07	-1.62

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Table 12 – *continued from previous page*

Dependent Variable	Variable	Estimate	Std. Error	Z-value
	credgdp	0.23	0.17	1.38
	unempl	-0.16	0.14	-1.18
	mean_cumxbind	-0.34	0.48	-0.72
	mean_annualco22	0.94	0.90	1.05
	mean_infl	-0.55	0.40	-1.38
	mean_stocks	0.54	0.31	1.74
	mean_credgdp	-0.01	0.31	-0.02
	mean_unempl	0.08	0.19	0.40
disclosure_of_climate_risk	(Intercept)	-0.25	0.26	-0.95
	cumxbind	0.92***	0.07	12.97
	annualco22	-2.01*	0.83	-2.43
	infl	0.12**	0.04	3.05
	stocks	0	0.07	0.01
	credgdp	0.17	0.18	0.94
	unempl	-0.81***	0.14	-5.70
	mean_cumxbind	-0.98*	0.41	-2.39
	mean_annualco22	2.21*	0.90	2.45
	mean_infl	-0.45	0.35	-1.29
	mean_stocks	0.23	0.26	0.86
	mean_credgdp	0.26	0.28	0.93
	mean_unempl	0.79***	0.17	4.55

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

C Bayesian logistic estimation

Unlike frequentist methods, which treat parameters as fixed but unknown quantities, Bayesian inference treats parameters as random variables with probability distributions. This approach allows for explicit quantification of uncertainty and the incorporation of prior information, making it particularly useful in settings with high parameter uncertainty or limited data.

The Bayesian logistic model is specified as:

$$\text{logit}(P(Y_{ij} = 1)) = \beta_0 + \beta_1 X_{1ij} + \beta_2 X_{2ij} + \cdots + u_j \tag{6}$$

where u_j represents country-level variation, analogous to the random effects in the GLMM framework.

C.1 Estimation and prior specification

The model is estimated using Markov Chain Monte Carlo (MCMC) sampling with four independent chains, each running for 2000 iterations, including 1000 warm-up iterations, implemented via the No-U-Turn Sampler (NUTS), a variant of Hamiltonian Monte Carlo known for its efficiency in high-dimensional parameter spaces.

To ensure robustness while avoiding excessive regularization, weakly informative priors are specified. Coefficients β_k follow a normal prior distribution, $\beta_k \sim N(0, 2)$, reflecting prior uncertainty about the effects of covariates without imposing strong assumptions. The country-level random effects are modeled as $u_j \sim N(0, \sigma_u^2)$, allowing the data to inform variation across countries.

C.2 Posterior inference

The Bayesian approach provides full posterior distributions for each parameter, from which credible intervals are derived rather than frequentist confidence intervals. This probabilistic interpretation enhances inference reliability, particularly in small-sample settings or cases where traditional maximum likelihood estimation struggles with parameter uncertainty. Results are reported in Table 13.

Dependent_Variable	Variable	Mean	Lower_95_CI	Upper_95_CI	Odds_Ratio	n_eff	Rhat
adoption_climate_finance_target	Intercept	-8.78	2.93	-14.68	-3.02	0.00	1.00
	cumxbind	0.01	0.00	0.00	0.01	1.01	1.00
	logco2em	0.24	0.16	-0.07	0.55	1.27	1.01
	infl	0.04	0.02	0.01	0.08	1.04	1.00
	logstocks	0.23	0.15	-0.05	0.53	1.26	1.00
adoption_mitigation_target	Intercept	3.01	2.92	-2.81	8.77	20.27	1.00
	cumxbind	0.01	0.00	0.01	0.01	1.01	1.00
	logco2em	-0.23	0.16	-0.55	0.09	0.80	1.00
	infl	0.07	0.01	0.04	0.09	1.07	1.00
	logstocks	0.04	0.07	-0.10	0.18	1.04	1.00
adoption_divestment_target	Intercept	-3.43	2.62	-8.76	1.65	0.03	1.00
	cumxbind	0.01	0.00	0.01	0.01	1.01	1.00
	logco2em	0.06	0.14	-0.22	0.34	1.06	1.00
	infl	0.03	0.01	0.01	0.06	1.03	1.00
	logstocks	0.08	0.08	-0.08	0.23	1.08	1.00
implementation_score	Intercept	-0.53	2.93	-6.32	5.27	0.59	1.00
	cumxbind	0.00	0.00	0.00	0.01	1.00	1.00
	logco2em	0.03	0.16	-0.29	0.35	1.03	1.00
	infl	0.04	0.01	0.02	0.07	1.04	1.00
	logstocks	0.09	0.07	-0.05	0.24	1.10	1.00
policy_engagement	Intercept	-4.66	2.95	-10.58	1.02	0.01	1.00
	cumxbind	0.00	0.00	0.00	0.01	1.00	1.00
	logco2em	0.18	0.16	-0.13	0.50	1.20	1.00
	infl	0.03	0.01	0.01	0.06	1.03	1.00
	logstocks	0.07	0.07	-0.06	0.21	1.08	1.00
climate_risk_strategy	Intercept	-3.40	2.87	-8.96	2.28	0.03	1.00
	cumxbind	0.00	0.00	0.00	0.00	1.00	1.00
	logco2em	0.11	0.16	-0.20	0.42	1.11	1.01
	infl	0.02	0.01	-0.00	0.05	1.02	1.00
	logstocks	0.09	0.07	-0.04	0.23	1.10	1.00
climate_risk_management	Intercept	-3.73	2.89	-9.40	2.15	0.02	1.00
	cumxbind	0.00	0.00	0.00	0.00	1.00	1.00
	logco2em	0.12	0.16	-0.19	0.44	1.13	1.01
	infl	0.02	0.01	-0.00	0.04	1.02	1.00
	logstocks	0.08	0.07	-0.07	0.22	1.08	1.00
disclosure_of_climate_risk	Intercept	-0.04	2.66	-4.96	5.32	0.96	1.01
	cumxbind	0.01	0.00	0.01	0.01	1.01	1.00
	logco2em	-0.11	0.15	-0.40	0.16	0.90	1.01
	infl	0.05	0.01	0.03	0.08	1.05	1.00
	logstocks	0.17	0.07	0.04	0.30	1.18	1.00

Table 13: Bayesian logistic regression results with odds ratios and convergence diagnostics