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Climate laws and financial stability

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ABSTRACT

We examine the impact of climate laws on financial stability, addressing a key but underexplored aspect of financial regulation. As climate risks intensify, climate laws variously mandate that financial institutions, markets and regulators integrate climate risk considerations into their stability frameworks. Using panel data from 92 countries during 2013–2020 and employing fixed-effects regression, instrumental variable estimation, and propensity score matching, the analysis finds that stronger climate law implementation enhances financial stability by reducing systemic risks, credit defaults, and market distortions. However, the effectiveness of climate regulations varies based on the nature of regulations, institutional strength, financial market depth, and enforcement mechanisms. The findings contribute to the growing discourse on climate-aligned financial regulation, providing empirical evidence on how climate laws function as macroprudential tools. This study offers policy-relevant insights for regulators, central banks, and financial institutions, emphasizing the need for comprehensive enforcement strategies to maximize the financial stability benefits of climate policies.

1. Introduction

The impact of climate laws and regulations on financial stability has become an increasingly relevant topic in economic and financial research. As climate risks, both physical (e.g., extreme weather events) and transition-related (e.g., policy and technological shifts), intensify, financial institutions and regulators face mounting pressures to integrate climate risk considerations into their decision-making processes (Krogstrup and Oman, 2019; de Bandt et al., 2024).

Prior research has examined financial stability from multiple perspectives, including bank risk-taking (Laeven and Levine, 2009), systemic risk exposure (Acharya et al., 2017), and the role of prudential regulation (Borio, 2011). While macroprudential policies and bank governance have been widely studied, the role of climate-related laws and regulations in shaping financial stability has received limited empirical attention (Brunetti et al., 2024). From a climate policy perspective, most existing research falls into two strands. The first examines climate *risk*'s impact on financial stability. Schoenmaker and Schramade (2019) explore the association among financial risk, corporate ESG disclosures, sustainable investments, and green finance policies. Liu and He (2024) highlight market volatility and credit risks, emphasizing climate stress testing. Chabot and Bertrand (2023) discuss policy responses to stabilize financial markets, while Conlon and Ding (2024) link unexpected climate shocks to increased volatility. Ayele and Fisseha (2024) show that developing economies are particularly vulnerable, and Fan and Gao (2024) stress the role of financial institutions in mitigating risks through proactive policies. The second strand explores ESG factors and financial stability. Curcio et al. (2024) find firms with strong ESG ratings

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more resilient to systemic risks. Billio et al. (2024) stress regulatory frameworks for ESG transparency. Demaria and Rigot (2021) highlight inconsistencies in corporate environmental reporting among French banks. Brown and Williams (2023) show that ESG-focused funds reduce volatility, while Gupta and Cheng (2024) and Lee and Kim (2022) emphasize green finance and banking's role in financial resilience.

While these research strands provide valuable insights into financial stability, they do not fully account for the impact of concrete and economy-wide climate policy actions, particularly the role of climate laws and regulations. The direct economy-wide effects of legally binding climate policies on financial markets, corporate risk exposure, and investment strategies remain underexplored and require thorough investigation. Furthermore, research has not systematically examined whether climate laws are an adequate measure of regulatory stringency, as variation in policy scope and enforcement strength may influence financial outcomes (Kohlscheen et al., 2024).

This paper addresses the gap in literature by conducting a comprehensive empirical analysis of how climate laws influence financial stability at the country level, focusing on the mechanisms through which legal and regulatory interventions shape financial resilience. It builds on theories of financial intermediation (Diamond and Dybvig, 1983), market efficiency (Fama, 1970), and prudential regulation (Merton, 1995) while also integrating legal and institutional frameworks (La Porta et al., 1998; North, 1990). By incorporating climate-related regulatory frameworks into the financial stability discourse, the study systematically accounts for economic, financial, and institutional determinants, ensuring that the estimated effects of climate laws are not confounded by other macroeconomic conditions.

This study utilizes panel data covering 92 countries from 2013 to 2020, integrating information from multiple databases. The primary outcome variable is financial stability, measured by a widely used banking sector risk indicator (Z-score), while the key independent variable is the number of climate-related laws and regulations in each country. The empirical strategy employs fixed-effects panel regression models to control for time-invariant country heterogeneity, addressing potential endogeneity concerns through instrumental variable estimation, coefficient stability tests, and propensity score matching. We move beyond cross-sectional associations by exploiting staggered timing in the adoption and strengthening of climate laws around the world. We implement a tightened instrumental-variables strategy and a suite of falsification and sensitivity analyses. These methodological designs aim to isolate changes in financial stability that are consistent with a causal effect of climate law adoption, conditional on transparent identifying testable assumptions.

The findings reveal that climate laws have a positive and statistically significant effect on financial stability, suggesting that stronger climate policies enhance the resilience of banking systems by reducing systemic risks associated with environmental uncertainty. However, the effect size varies based on institutional strength, financial market depth, and macroeconomic conditions, highlighting the importance of regulatory enforcement mechanisms. Moreover, climate laws are found to be particularly critical in developing economies, where financial systems are more vulnerable to climate-related risks. Climate laws facilitate internalization of climate risk by banks by clarifying future carbon costs, so lending shifts away from high-emission sectors; boosting transparent reporting, which eases funding frictions; setting clear "green" definitions that curb greenwashing and guide credit to lower-risk activities; and reducing policy uncertainty, smoothing swings in credit and loan quality. These channels make bank risk profiles calmer and more resilient.

This research makes several contributions to the fields of financial stability, climate finance, and regulatory economics by offering new empirical insights into the role of climate laws and regulations in shaping financial resilience. First, this study introduces a quantitative assessment of climate law implementation around the world and subsequently integrates climate regulations into financial stability analysis, bridging the gap between financial economics and environmental policy. While prior research has extensively examined the impact of prudential regulation, monetary policy, and governance quality on financial stability (Acharya et al., 2017; Laeven and Levine, 2009), little attention has been given to climate-related *laws* and *regulations* as a factor influencing systemic financial risks.

Existing research has already established that *climate risk* is financial risk, mapping physical and transition drivers to bank fragility and market stress (Carney, 2015; Dafermos et al., 2018; Battiston et al., 2021; Monasterolo, 2020; D'Orazio, 2025). Our contribution is different in scope: we distinguish *climate risk*, which captures the state of the world and its exposures, from *climate laws*, which is the legal and regulatory codification that can reshape information, incentives, and supervisory expectations economy-wide. We provide cross-country evidence on the association between the stock of enforceable climate laws and banking-sector stability, complementing stress-testing, asset-pricing, and network approaches that quantify how risk propagates through financial portfolios. In short, we study whether and how legal architecture matters for stability, conditional on macro-financial and institutional conditions. By incorporating climate *policy* variables into banking risk models, this study provides a novel framework for assessing the policy's financial implications.

Our contribution differs in object and measurement: rather than re-estimating climate-risk exposures or stress-testing portfolios, we examine whether national climate laws, e.g., binding statutes and executive instruments that codify disclosure baselines, taxonomies/eligibility, and supervisory expectations, are associated with banking-sector stability. Specifically, we add: a legal-architecture construct: a transparent, replicable country-year stock of enforceable climate laws, used in within-country designs; disaggregation of legal forms (framework/statutory laws, policies/executive regulations, mitigation-specific laws) to test which instruments map most closely into stability; a clarified analysis of transmission; and measurement transparency (formula for Z-score; alternative stability outcome via NPL; appendix tables/figures documenting the law stock and its trend). In other words, we study legal codification, not risk realization or uncertainty per se. Our distinct value is to bring the legal codification layer into focus and quantify its association with bank stability across 92 countries (2013–2020), complementing stress-testing and asset-pricing approaches that analyze climate-risk propagation.

Second, the study contributes to the emerging discourse on green financial regulation by providing empirical evidence on the role of climate laws as a complementary macroprudential tool. The findings suggest that well-designed climate regulations can strengthen financial stability by reducing transition risks, encouraging sustainable investment, and preventing systemic financial shocks. This contributes to ongoing debates on climate stress testing, sustainable finance frameworks, and green regulatory policies, which are gaining increasing relevance for central banks and financial supervisors (BIS, 2021; NGFS, 2019; Mertzanis, 2024).

Finally, the findings provide policy-relevant insights for regulators, central banks, and financial institutions seeking to enhance financial resilience in the face of climate-related financial risks. The results suggest that climate laws should be designed not just for environmental impact but also as a strategic tool for financial system stability. Policymakers should prioritize comprehensive enforcement mechanisms, ensure financial risk transparency, and incorporate climate risk factors into banking stress tests to safeguard financial markets against climate-induced economic disruptions. These insights are particularly relevant for developing economies, where climate risks are more pronounced and financial institutions are more vulnerable to environmental shocks.

In what follows, Section 2 reviews relevant literature on financial stability and climate regulations. Section 3 outlines the empirical strategy. Section 4 presents results, confirming a positive link between climate laws and financial stability. Section 5 addresses endogeneity through IV estimation and propensity score matching. Section 6 conducts robustness checks. Section 7 explores mitigation mechanisms influencing the effectiveness of climate laws. Section 8 concludes with policy implications and future research directions.

2. Related literature

This section examines financial stability, its measurement, and the impact of climate laws on financial resilience. It discusses the theoretical frameworks explaining the link between climate regulations and financial stability, explores the mechanisms through which climate laws influence financial systems, and considers other key determinants of financial stability. We use climate risk to denote physical and transition risk drivers and their propagation through markets and balance sheets; this is the focus of seminal analyses and policy frameworks (Carney, 2015; Dafermos et al., 2018; Battiston et al., 2021; Monasterolo, 2020; D'Orazio, 2025). By contrast, climate laws are binding statutes and executive instruments that codify disclosure baselines, taxonomies/eligibility, supervision expectations, and planning duties. Our empirical question asks whether variation in this legal infrastructure relates to bank stability, net of macro-financial controls and fixed effects. This clarifies that we do not re-estimate climate risk itself; rather, we assess the financial-stability payoff to legal codification. The section concludes by presenting the testable hypotheses for empirical analysis.

2.1. *Financial stability: concept and measurement*

Financial stability refers to a condition in which the financial system, including institutions, markets, and infrastructure, operates efficiently, facilitates economic processes, and is resilient to shocks, thereby minimizing the likelihood of crises (International Monetary Fund, 2004). A stable financial system effectively manages risks, absorbs disruptions, and maintains confidence in financial markets, ensuring the smooth functioning of credit intermediation and monetary transactions. Given its multifaceted nature, financial stability is typically measured using a combination of macroeconomic and financial indicators. Common approaches include monitoring key economic sectors and assigning critical values to various risk metrics (BIS, 2009). With respect to measurement, the CAMELS rating system assesses financial institutions' stability based on capital adequacy, asset quality, management quality, earnings, liquidity, and sensitivity to market risk (Federal Financial Institutions Examination Council, 1997). Additionally, the Z-score, widely used in literature, measures the distance of a financial institution's returns from insolvency by incorporating profitability, capitalization, and earnings volatility, where higher values indicate greater financial stability (Altman, 1968; Laeven and Levine, 2009). Another widely used measure is Non-Performing Loans (NPLs), which reflect the proportion of loans in default relative to total loans, serving as a key indicator of banking sector risk and credit portfolio quality (Beck et al., 2010). Furthermore, the Merton Model estimates default probability by treating equity as a call option on a firm's assets (Merton, 1974). At the systemic level, the Financial Soundness Indicators (FSIs), developed by the International Monetary Fund (IMF, 2024), monitor financial health through capital adequacy and asset quality (Bitetto et al., 2023). The Financial Stress Index, such as the OFR Financial Stress Index, aggregates data on credit, equity valuation, funding conditions, and market volatility to gauge financial distress (Office of Financial Research, 2024). The Systemic Risk Indicator, provided by the Federal Reserve Bank of Cleveland (2024), measures banking system insolvency risk. Additionally, Basel III liquidity ratios, including the Liquidity Coverage Ratio and Net Stable Funding Ratio, ensure banks maintain adequate liquidity to withstand financial stress (BIS, 2011a). These measures collectively provide insights into individual institutions' stability and the broader financial system's resilience, helping policymakers and regulators manage financial risks effectively. Despite these diverse methodologies, measuring financial stability remains challenging, as it requires assessing the resilience of the entire financial system to a broad range of potential disruptions, including macroeconomic fluctuations, financial market stress, and systemic risks. The ongoing evolution of financial stability frameworks emphasizes the importance of integrating microprudential, macroprudential, and systemic risk assessment tools to provide a more comprehensive understanding of financial system vulnerabilities (BIS, 2009).

2.2. *Theoretical frameworks*

Several theoretical frameworks help provide the basis for explaining the link between climate laws and financial stability, each offering insights into how regulatory interventions shape financial system resilience. From a financial perspective, risk management and financial stability theory suggests that financial stability depends on how well financial institutions identify, assess, and manage risks (Acharya et al., 2017). Climate laws influence financial stability by mandating risk assessment frameworks, stress testing climate-related financial risks, and integrating sustainability considerations into financial decision-making. By enforcing stricter environmental risk evaluations, climate regulations ensure that financial institutions proactively address transition and physical risks associated with climate change, reducing the likelihood of systemic financial instability.

We ground our focus on climate laws, e.g., binding statutes and executive instruments, by linking them to classic and contemporary theories of financial stability. In the Diamond–Dybvig (1983) framework, solvency and liquidity buffers reduce run vulnerability; laws that codify disclosure duties, governance, and supervisory expectations plausibly strengthen those buffers by improving risk management and stabilizing funding structures. A Minskyan (1986) lens further suggests that credible, durable legislation can dampen boom–bust dynamics by lowering policy uncertainty and curbing abrupt transition-risk repricing. From a Fama (1970) market-efficiency perspective, mandated, decision-useful disclosure reduces information asymmetries and funding premia, improving banks' distance-to-default. Finally, sustainable-finance theory emphasizes capital steering: taxonomies and transition plans induced by law reallocate credit away from high-emission sectors, lowering portfolio tail risk (Schoenmaker and Schramade, 2019). These perspectives justify expecting a direct stabilizing association of climate laws, via disclosure, governance, and capital-allocation commitments, while also allowing for indirect effects that propagate through economic and institutional conditions. Climate laws, by enforcing stricter environmental risk assessments and sustainable finance practices, could function as complementary macroprudential tools that reduce financial fragility.

The econometric design implements these theoretical links transparently. We use a bank-centric Z-score as the primary outcome, consistent with Diamond–Dybvig and the disclosure-driven cost-of-funds channel in Fama, and NPL as a complementary asset-quality check (Minsky). Country and year fixed effects ensure the climate law effect is identified by within-country changes in the legal architecture rather than cross-sectional differences. We disaggregate law types (framework statutes, executive regulations, mitigation-specific acts) because theory predicts stronger stability effects where disclosure/supervision hooks are binding. Variables such as bank profitability, market depth, governance, and policy stability are treated as moderators (scope conditions), they shape how law-induced information, pricing, and uncertainty reductions transmit, rather than as mediators. This interpretive stance aligns with macro-financial models showing that robust climate policy improves balance-sheet resilience (Dafermos et al., 2018) and with network stress-testing evidence that credible policy curbs stranded-asset contagion (Battiston et al., 2017), providing theoretical support for both the direct law effect we estimate and the plausibility of indirect propagation through institutional and market conditions.

From a legal perspective, the theory of legal origins suggests that a country's legal framework shapes financial regulation, market efficiency, and investor protections (La Porta et al., 1998). Stronger legal enforcement mechanisms enhance compliance with climate regulations, reducing environmental and financial risks. Likewise, the regulatory compliance and prudential regulation theory emphasizes that financial institutions adjust their risk-taking behavior based on regulatory stringency and predictability (Merton, 1995). Climate laws introduce mandatory disclosure requirements, stress testing, and capital buffers for climate-related financial risks, ensuring that financial institutions remain resilient in the face of climate-driven financial shocks. Further, the corporate governance and legal accountability theory highlights that transparent governance structures mitigate financial misconduct and systemic risks (Shleifer and Vishny, 1997). Climate laws, through enhanced corporate disclosure and governance standards, ensure that firms integrate climate risks into their financial planning, reducing systemic instability.

From an institutional perspective, the new institutional economics framework explains that well-functioning institutions create stable economic environments by shaping incentives and market behavior (North, 1990). Climate laws function as institutional mechanisms that guide financial decision-making, enforce sustainable finance policies, and prevent excessive risk-taking related to climate change. The political economy of regulation suggests that regulatory decisions are influenced by the balance between public interest and private industry lobbying (Stigler, 1971). Accordingly, financial stability outcomes depend on whether climate laws align regulatory incentives with long-term financial resilience while maintaining regulatory independence from political pressures. Further, the varieties of capitalism theory argues that different institutional structures shape how financial systems respond to regulatory changes (Hall and Soskice, 2001). Climate laws operate differently in highly regulated financial systems compared to market-driven economies, influencing how financial institutions adjust to climate-related risks. Lastly, the adaptive governance and policy responsiveness theory suggests that climate regulations are part of a dynamic governance system that responds to emerging environmental and financial risks (Berkes, 2010). Countries with strong adaptive regulatory institutions are better able to implement climate policies that promote financial stability.

These financial, legal, and institutional frameworks could explain why climate laws impact financial stability. From a financial perspective, climate laws reduce systemic risks, improve market efficiency, and mitigate financial fragility. From a legal standpoint, they enhance regulatory compliance, corporate governance, and financial transparency. From an institutional perspective, climate laws shape market expectations, influence governance structures, and strengthen financial resilience. Understanding these linkages is crucial for designing effective climate policies that balance environmental sustainability with financial stability.

2.3. Climate laws and financial stability – direct effects

Climate laws and regulations impact financial institutions and financial markets and therefore financial stability through direct mechanisms, including risk assessment, credit risk reduction, stress testing, and transparency. These channels function at an institutional level, affecting financial intermediaries and issuers' financial decisions.

One channel is the internalization of climate-related financial risks. Climate laws enforce mandatory risk assessments for financial institutions, requiring them to incorporate climate risks into credit allocation, investment strategies, and overall risk management. Climate risk exposure significantly influences financial stability, particularly through its effects on intersectoral financial linkages (Hu and Zhu, 2025). Climate-related risks can deteriorate loan quality in banks, making it necessary to integrate climate considerations into credit assessments (Wu et al., 2024). In response to increasing environmental threats, banks have modified lending behavior, adopting stricter credit policies in high-risk regions (Aslan et al., 2022). Regulatory policies play a critical role in ensuring that financial institutions develop long-term strategies for mitigating environmental and climate-related shocks (Nieto, 2019). Furthermore, reducing risk exposure to stranded assets, investments that may lose value due to environmental policies or technological advancements, is another related channel. The Equator Principles (Power and Tandja-M., 2024) outlines a widely recognized risk management framework for banks, ensuring that financial institutions assess and manage environmental and social risks in project finance. By steering capital toward sustainable industries, climate regulations can reduce systemic vulnerabilities associated with transition risks.

Another channel is the reduction in credit risk and default probabilities. Climate laws can lower default risks by encouraging businesses to adopt sustainable financial models and align with environmental standards. Financial institutions that integrate climate-related lending guidelines into their policies experience lower default probabilities and non-performing loans (NPLs) (Fan and Gao, 2024). Climate disasters and extreme weather events increase banking sector vulnerabilities, making it essential for banks to adjust their credit risk models (de Bandt et al., 2024). Furthermore, empirical evidence suggests that firms adhering to environmental regulations tend to have higher creditworthiness, reducing overall risk exposure for financial institutions (European Central Bank, 2022). Companies that proactively transition to sustainable business models benefit from lower regulatory penalties, improved investor confidence, and more favorable financing conditions. These findings align with prior research indicating that environmental risk mitigation strengthens financial stability by reducing systemic credit risk (Dulak and Gnabo, 2024).

A further channel is climate stress testing and scenario analysis. Regulatory frameworks now mandate climate stress testing to evaluate financial sector resilience under extreme climate scenarios. Studies advocate standardized stress testing methodologies to assess systemic risks and ensure that banks maintain adequate capital buffers (Acharya et al., 2023). Research also highlights the role of financial regulation in managing climate-related uncertainties (Brik, 2024; Chen and Luo, 2024). Stress testing helps banks and regulators assess vulnerabilities early, allowing them to implement proactive measures to safeguard financial stability. Regulatory bodies like the Financial Stability Oversight Council (2021) emphasize the need to incorporate macroprudential strategies into climate stress testing to prevent sudden financial instability.

Moreover, market transparency and corporate disclosure is another channel through which climate laws and regulations affect stability. Climate laws improve market transparency by mandating climate risk disclosures, which enhance investor confidence, capital allocation efficiency, and financial stability (Billio et al., 2024; Curcio et al., 2024). ESG-focused investments also exhibit lower volatility, reinforcing the argument that transparent climate disclosures reduce systemic risk (Brown and Williams, 2023). Regulatory bodies such as the U.S. Securities & Exchange Commission (2024a) and the International Sustainability Standards Board (2023) advocate for standardized reporting frameworks, ensuring that climate risks are accurately priced to prevent financial misallocations. These transparency measures are also critical in reducing greenwashing, where firms falsely claim sustainability credentials, leading to mispriced financial risks (Demaria and Rigot, 2021).

In plain terms, climate laws can steady a country's banking system through four linked channels. First, by making future carbon and compliance costs clearer, they push banks to charge more for high-emission lending and gradually shift portfolios toward cleaner sectors, so losses are less likely when transition policies bite. Second, by boosting transparent, comparable climate reporting, they give investors and supervisors better information, which tends to lower banks' funding frictions and reduce sudden market repricing. Third, by setting common "green vs. non-green" definitions (taxonomies), they cut greenwashing and help banks steer credit toward activities that are less exposed to transition and liability risks. Finally, by clarifying the policy path and aligning it with prudential expectations, they reduce uncertainty and smooth swings in credit growth and loan quality. Together, these pathways make banks' risk profiles calmer and more resilient, which shows up as higher financial stability.

Recent advances further clarify how climate policy transmits to financial stability. On risk modelling, supervisors increasingly rely on the NGFS Phase V scenarios to map transition and physical risks into macro-financial variables (Network for Greening the Financial System, 2024). System-wide climate stress tests, including the ECB's 2022 exercise and the ECB's economy-wide methodology, show materially higher losses under disorderly transitions and "hot-house" paths, while documenting methodological limits (Alogoskoufis et al., 2021; European Central Bank, 2022). Capital-market research indicates that transition risk is priced and that climate-news shocks are hedgeable, implying that disclosure and policy signals propagate through markets (Bolton and Kacperczyk, 2021, 2023; Engle et al., 2020). On green taxonomies, jurisdictions have converged toward clearer classification systems, which reduce definitional risk and curb greenwashing. Such policies include prominently the EU Taxonomy (European Union, 2020), the ASEAN Taxonomy v2 (ASEAN Taxonomy Board, 2023), the Singapore-Asia Taxonomy (Monetary Authority of Singapore, Green Finance Industry Taskforce, 2023), and China's Green Bond Endorsed Projects Catalogue (2021) (People's Bank of China, National Development and Reform Commission, & China Securities Regulatory Commission, 2021). On disclosure, the IFRS S1/S2 standards (International Sustainability Standards Board, 2023) provide a global baseline aligned with TCFD, the EU's ESRS implement CSRD (European Commission, 2023), EBA Pillar-3 ESG templates formalize bank-level prudential disclosure (European Banking Authority, 2022), and the SEC's climate rule underscores policy heterogeneity (U.S. Securities and Exchange Commission, 2024, 2025), with international monitoring coordinated by the FSB (Financial Stability Board, 2023). Our study complements this frontier by linking economy-wide climate laws, the upstream legal conditions that shape disclosure, taxonomy uptake, and supervisory practices, to country-level banking stability.

2.4. Climate laws and financial stability – broader indirect effects

Climate laws can have wider systemic and macroeconomic impacts through policy uncertainty, capital flows, sectoral risks, and the integration of climate policy into monetary and fiscal frameworks. An indirect channel of influence is climate policy uncertainty and market volatility mitigation. Uncertainty in climate policies can cause financial instability, as firms and investors struggle to predict regulatory shifts. Inconsistent climate regulations increase market volatility, making financial systems more vulnerable (Chen and Wang, 2024). However, the gradual adoption of climate regulations can mitigate these risks by stabilizing financial expectations (Ugolini et al., 2024). Relatedly, carbon pricing regulations also affect financial stability. Research finds that while carbon pricing reduces climate transition risks, poorly designed systems may introduce new financial vulnerabilities (Garcia and Torres, 2023).

Another channel is sectoral and regional climate risk variations. Climate-related risks affect financial stability differently across regions and industries. Research highlights the need for region-specific financial policies to manage localized climate shocks (Hu et al., 2025). In China, financial instability due to climate disasters necessitates adaptive risk management strategies (Wu and Lin, 2024). Similarly, the insurance sector faces increasing exposure to climate-related losses, requiring advanced climate risk modeling (Chen and Lin, 2024).

Sustainable investment and long-term financial planning are another channel through which climate laws can affect stability. Climate laws influence investment decisions and long-term financial planning, particularly through green finance, ESG investments, and corporate governance reforms. Sustainable finance reduces systemic risks by shifting capital away from high-carbon industries and stabilizing asset valuations (ESMA, 2021; OECD, 2021). Empirical evidence suggests that financial institutions integrating ESG principles experience enhanced stability due to stronger governance and reduced speculative investments (Gupta and Cheng, 2024; Lee and Kim, 2022).

Lastly, macroeconomic stability, capital flows, and monetary policy are also important. Climate laws influence macroeconomic stability by reducing economic shocks, stabilizing capital flows, and enhancing financial market resilience. Research suggests that strong climate policies attract stable foreign direct investment (FDI) and institutional capital, reinforcing investment stability (IMF, 2024; Christnacht and Mertzanis, 2025). Central banks are also integrating climate risks into monetary policies, ensuring that financial institutions align with sustainability goals (D'Orazio and Popoyan, 2023; Dikau and Volz, 2021). Predictable and well-enforced climate policies also reduce uncertainty in interest rates and exchange rates, contributing to stronger financial stability frameworks (ECB, 2018).

Overall, climate laws exert both direct and indirect effects on financial stability. The direct effects focus mainly on how financial institutions integrate climate risks, while the indirect effects examine systemic financial stability implications of climate policy. This structure enhances clarity by grouping research based on similar analytical approaches and the level at which climate laws operate.

2.5. Other determinants of financial stability

Financial stability is influenced by both financial and non-financial factors that shape the resilience of financial institutions and markets. Banks' regulatory capital ratio is an important determinant of financial stability as it ensures banks can absorb financial shocks (BIS, 2011b). Bank profitability strengthens financial resilience by reducing fragility during downturns (Asteriou et al., 2020). Additionally, regulatory oversight mitigates moral hazard and enhances investor confidence (Federal Reserve Board, 2024). Also, market concentration within the banking sector impacts systemic risk, as excessive concentration can heighten vulnerabilities. Morgan Stanley (2024) discusses how stock market concentration may be justified when market capitalizations reflect genuine value creation prospects, but excessive concentration can lead to instability.

Market-related factors also affect financial stability. For example, financial market depth enhances stability by providing liquidity and risk diversification (Cantú and Chui, 2019). Higher market volatility often signals increased financial instability. Financial markets commonly use volatility as a proxy for stability, as extreme fluctuations can signal underlying systemic risks (World Bank, 2016). Asset price fluctuations in stocks, bonds, and real estate also pose risks, as sudden corrections can destabilize financial markets. Declining inflation and central bank rate cuts have contributed to rising asset prices, keeping financial market volatility subdued but also increasing fragility (IMF, 2024). Moreover, interest rate movements, exchange rate fluctuations, and unemployment levels, significantly affect investment volatility and overall financial resilience. Denizer et al. (2000) argue that underdeveloped financial markets and weak linkages between savers and investors contribute to macroeconomic fluctuations, exacerbating financial instability.

Macroeconomic and institutional factors also play a crucial role in financial stability. Inflation, by affecting the real value of assets and monetary policy responses, can either stabilize or destabilize financial markets (IMF, 2025). Governance factors, such as the control of corruption, influence risk-taking behavior in the financial sector, while policy stability reduces regulatory uncertainty, fostering confidence in financial markets (Asteriou et al., 2020; Federal Reserve Board, 2024). Together, these bank-related and institutional factors ensure a robust financial system that can withstand systemic risks and economic fluctuations. Lastly, the flight-to-quality phenomenon, where investors shift capital from riskier assets to safer ones during economic uncertainty, can lead to liquidity shortages and imbalances. The IMF (2024) notes that investor reactions to economic shocks can result in capital outflows from emerging markets, triggering instability in financial systems.

2.6. Research hypotheses

We hypothesize that climate laws and regulations shape financial stability alongside bank- and market-side determinants. In plain terms, four testable propositions guide the analysis. First (***H1***: direct effect): when a country strengthens its climate laws, bank stability should improve; we expect a clear positive association between stronger legal architecture and higher stability. Second (***H2***: capacity and governance): this stabilizing link should be stronger where banks are healthier and better run (e.g., more profitable) and where rules that limit conflicts of interest are tighter; in those settings, banks can act on the laws more effectively. Third (***H3***: legal-form salience): not all instruments matter equally, broad framework/statutory laws should show the strongest connection to stability, executive regulations a smaller one, and mitigation-only provisions the weakest. Fourth (***H4:*** asset-quality cross-check): if the stability story holds, the share of non-performing loans should fall as climate-law intensity rises.

We do not run a climate stress-testing framework or an asset-pricing model. Instead, we ask whether the legal environment associated with those supervisory and market practices correlates with improved banking stability. In prudential doctrine, climate considerations are treated as drivers of existing risk categories (credit, market, operational), with supervisory expectations articulated in BCBS principles and implemented by authorities such as the ECB using NGFS scenarios (Basel Committee on Banking Supervision, 2022; ECB, 2022; NGFS, 2024). Our analysis therefore provides the macro-institutional complement to those micro-prudential toolkits.

We interpret climate legislation primarily as an enabling framework that supports, rather than substitutes for, prudential policy. By harmonizing definitions (EU, ASEAN, Singapore-Asia, and China taxonomies), mandating decision-useful disclosure (IFRS S1/S2; ESRS; Pillar-3 ESG), and reducing policy uncertainty (monitored by the FSB and reflected in the evolving SEC stance), climate law can lower information frictions and align incentives, thereby complementing supervisory principles for climate-related financial risks (ASEAN Taxonomy Board, 2023; BCBS, 2022; EBA, 2022; European Commission, 2023; European Union, 2020; FSB, 2023; ISSB, 2023; Monetary Authority of Singapore, Green Finance Industry Taskforce, 2023; People's Bank of China *et al.*, 2021; SEC, 2024, 2025). Accordingly, our results should be read as evidence consistent with an enabling effect of climate law on stability, conditional on prudential implementation.

3. Empirical strategy

3.1. Data

To address the research question on the effect of climate laws on financial stability, we use country-level panel data covering the period 2013–2020 based on availability. The key outcome variable, banking sector financial stability, uses data from the World Development Indicators, while the main explanatory variable, climate-related laws and regulations, uses data from the Climate Change Laws of the World database. To enhance the analysis, we merge this data with variables capturing financial, environmental, and technological conditions, incorporating financial sector indicators from the IMF Financial Development Database, macroeconomic and inflation data from the World Development Indicators, competitiveness and regulatory indicators from the World Economic Forum's Global Competitiveness Report, and governance and institutional quality measures from the Worldwide Governance Indicators. After merging all relevant sources, the final dataset consists of 692 country-year observations from 92 countries. Beyond 2020, several of these series are not yet consistently available or harmonized across our full country set. Due to missing data for certain variables in specific countries and years, the panel is weakly unbalanced. To address potential outliers, we winsorize all continuous variables at the 1 % and 99 % levels to reduce skewness and improve interpretability. This dataset provides the foundation for analyzing the relationship between climate laws and financial stability while controlling for key economic, financial, and institutional factors.

3.2. Key variables

The outcome variable in this study is the Z-score (FINSTAB) for the banking sector, sourced from the World Development Indicators, which serves as a widely used measure of banking sector stability by estimating the probability of insolvency. It is calculated as the sum of a bank's return on assets (ROA) and capital-to-asset ratio, divided by the standard deviation of ROA, where ROA reflects profitability, the capital-to-asset ratio indicates a bank's ability to absorb financial shocks, and the standard deviation of ROA captures earnings volatility (Altman et al., 2017). The FINSTAB represents the number of standard deviations a bank's ROA would need to decline before insolvency occurs, meaning that higher values indicate greater financial stability and a lower probability of default, while lower values signal higher financial fragility and an increased risk of banking crises. This measure provides a robust indicator of systemic risk, making it a key tool for assessing financial stability across countries (Altman, 2018). The banking-sector Z-score summarizes insolvency risk by combining profitability, capitalization, and earnings volatility. Later, our first sensitivity test replaces Z-score with the non-performing loans ratio (NPL, % of total gross loans), an orthogonal indicator of asset-quality stress at the banking-system level.

Further, the number of climate-related laws and regulations per country serves as a key independent variable (CLIMLAW) in this study, sourced from the Grantham Research Institute's Climate Change Laws of the World database (https://climate-laws.org/). This comprehensive database catalogs over 5000 climate laws and policies across more than 196 countries and territories, including the European Union. It encompasses a wide array of legal instruments, such as framework laws, adaptation and mitigation policies, and sector-specific regulations, all aimed at addressing climate change. Each country's profile within the database details the total number of these legal instruments, providing a quantitative measure of a nation's legislative commitment to climate action. This count reflects collectively the effect of a country's legal framework concerning climate change, encompassing laws that set targets, establish institutions, and outline strategies for both climate mitigation and adaptation. By analyzing this variable, we can assess the extent to which a country has institutionalized climate change considerations into its legal system, thereby influencing its environmental policies and practices.

Following established practice in the comparative policy literature, we transform the country-year stock of climate laws into a multi-level categorical measure. Prior studies routinely stratify countries by law/policy counts to enable cross-country comparisons and downstream analysis (e.g., distributional thresholds such as '>5' and '>20' laws and 'most comprehensive legislators' (Eskander et al., 2021); count-based groups and maps (Nachmany *et al.,* 2022); and clustered country groups from policy counts (Nascimento et al., 2022). We therefore define CLIMLAW as 0 (no laws), 1 (1–3 laws), and 2 (>3 laws), a parsimonious coarsening that (i) aligns with distributional thresholds reported in the global legislation literature; (ii) captures the 'minimum bundle' idea found in policy-mix work; and (iii) follows standard practice of binning policy counts to improve interpretability and robustness. These thresholds are motivated by policy completeness, since in our sample 1–3 laws typically reflect a partial framework (e.g., a framework law plus one or two sectoral instruments), whereas > 3 usually indicates a more comprehensive legal bundle (framework plus sectoral/implementation tools, such as disclosure/transition planning). Further, they capture non-linearity, whereby the marginal information and coordination gains plausibly rise when a minimum bundle exists, after which effects taper; and finally provide measurement-error robustness, whereby coarser bins reduce noise from heterogeneous cataloging and drafting practices across countries. We do not assume these thresholds are uniquely correct; later we show that results are stable under fully continuous and data-driven alternatives.

Also note that coarsening a noisy institutional measure can aid interpretability and reduce model-dependence without discarding the raw variation used in analysis (Iacus et al., 2012). Moreover, cross-country climate policy work routinely counts and groups legal instruments (Eskander and Fankhauser, 2020; Nachmany et al., 2017), and leading stringency indices score and aggregate multiple policy tools into discrete categories (Botta and Koźluk, 2014). Our practice follows this convention: the count is the analyzable construct; the bins summarize policy "bundles" that are meaningful to policymakers.

We stress that our primary construct, CLIMLAW, is a de jure legal-architecture measure intended to capture the presence of binding

Table 1
Global trends in financial stability and climate laws (average country values).

Country	Financial stability	Climate law policy	Country	Financial stability	Climate law policy
Australia	13.49	0.38	Luxembourg	50.54	0.75
Austria	31.96	0.38	Madagascar	16.29	0.63
Bahrain	8.33	0.00	Malawi	17.20	0.50
Bangladesh	15.35	0.50	Malaysia	19.38	0.25
Belgium	16.42	0.50	Mali	13.81	0.75
Bolivia	9.92	0.38	Mauritius	16.05	0.50
Brazil	16.13	1.25	Mexico	20.76	1.13
Bulgaria	8.57	0.38	Mongolia	34.31	0.50
Burkina Faso	9.56	0.63	Morocco	42.22	1.00
Burundi	15.33	0.14	Mozambique	6.02	0.43
Cabo Verde	20.87	0.13	Namibia	25.31	0.00
Cambodia	26.10	1.50	Netherlands	11.13	0.88
Cameroon	10.20	0.00	New Zealand	41.67	0.33
Canada	13.95	1.13	Nigeria	16.36	0.57
Chile	8.39	0.88	Norway	11.15	0.50
China	22.53	0.25	Pakistan	10.96	0.75
Colombia	6.04	1.50	Panama	36.99	0.89
Costa Rica	19.05	0.88	Paraguay	15.80	0.50
Czech Rep.	11.21	0.38	Peru	17.45	0.75
Denmark	22.52	0.50	Philippines	21.01	0.88
Ecuador	10.48	0.63	Poland	9.48	1.00
Egypt	21.47	0.38	Portugal	13.34	0.88
El Salvador	21.83	0.25	Russia	6.79	0.38
Estonia	10.60	0.25	Rwanda	20.38	0.50
Finland	13.75	0.88	Saudi Arabia	21.83	0.13
France	18.81	1.22	Senegal	14.32	0.50
Georgia	8.10	0.25	Seychelles	14.34	0.00
Germany	17.30	0.88	Singapore	30.23	0.50
Ghana	13.78	0.13	Slovak Rep.	23.68	0.50
Greece	7.57	1.00	Slovenia	4.42	0.38
Guatemala	30.27	0.25	South Africa	15.37	0.63
Hungary	7.34	1.00	Spain	19.13	1.38
Iceland	1.95	0.25	Sweden	35.39	0.50
India	16.93	0.50	Switzerland	16.79	0.38
Indonesia	4.99	0.75	Tanzania	19.50	0.75
Ireland	13.10	1.00	Thailand	7.92	0.75
Israel	30.95	0.25	Türkiye	10.41	0.63
Italy	13.22	1.00	UAE	25.16	0.38
Japan	16.32	1.13	Uganda	14.95	0.38
Jordan	55.58	0.13	UK	15.96	1.00
Kazakhstan	2.43	0.13	Uruguay	6.68	0.50
Kenya	23.44	0.63	USA	33.70	0.63
Korea, Rep.	11.29	0.75	Vietnam	13.65	0.88
Lao PDR	11.68	0.25	Yemen	20.16	0.00
Latvia	7.65	0.25	Zambia	10.23	0.63
Lebanon	19.04	0.38	Total average	17.49	0.58
Lithuania	7.19	0.25			

Note: The table reports the general trends of the key research variables, based on authors' calculation.

rules that codify disclosure baselines, eligibility/taxonomy, and supervisory expectations. As a legal stock, CLIMLAW is distinct from measures of policy uncertainty, which track how uncertain economic agents are about the direction, timing, or enforcement of climate policy. We therefore do not interpret CLIMLAW as an uncertainty proxy; rather, it measures the extent of codified law.

Finally, we recognize the limitation that, while the number of climate laws and regulations serves as a useful quantitative benchmark, it does not fully capture separately the breadth and depth of these laws on financial stability. Breadth refers to the range of sectors and financial institutions affected, while depth reflects the stringency of enforcement, compliance obligations, and financial penalties for non-compliance. Relying solely on the number of regulations may overlook variations in policy effectiveness, as some laws are more comprehensive, strictly enforced, or influential in shaping financial risk disclosures than others. Despite this limitation, we consider this variable to be a reasonable proxy for overall climate policy conditions. We mitigate this limitation by disaggregating legal forms (framework/statutory laws, policies/executive regulations, mitigation-specific provisions); using within-country designs (country & year fixed effects) so identification rests on legal changes rather than levels; and interpreting results as evidence consistent with, not proof of, an enabling legal effect on stability. Where appropriate, climate policy uncertainty measures can be viewed as an ancillary state variable affecting how effectively laws translate into behavior. Because it reflects agents' uncertainty about climate policy (not the legal stock), climate policy uncertainty should enter the analysis as a separate regressor or moderator in future research.

Table 1 presents country-level averages for FINSTAB and CLIMLAW. Countries with the highest financial stability scores include Jordan (55.58), Luxembourg (50.54), Morocco (42.22), New Zealand (41.67), and Sweden (35.39), indicating strong banking systems with low insolvency risk. In contrast, the lowest financial stability scores are observed in Iceland (1.95), Kazakhstan (2.43), Slovenia (4.42), Indonesia (4.99), and Russia (6.79), suggesting higher financial fragility. Regarding climate law policy, Cambodia (1.50), Colombia (1.50), Brazil (1.25), and France (1.22) are among the countries with the strongest engagement in climate-related laws, while Bahrain, Namibia, Cameroon, Seychelles, and Yemen (0.00) have no climate laws recorded, reflecting minimal policy efforts. Mid-level countries such as Mexico (1.13), Canada (1.13), and Japan (1.13) show moderate levels of climate law adoption. The variation in these indicators highlights significant cross-country differences in financial stability and regulatory commitment to climate change policies.

Fig. 1 plots the cross-country mean of the ordinal climate-law score and shows a slowly rising trend: as more countries adopt and accumulate enforceable climate legislation, the average increases slowly, with small step-ups mid-period, while large year-to-year swings are rare because the series tracks a stock of laws "in force." This remains true during the Paris Agreement period (2015) and its implementation (2016). The non-integer values are expected, since the figure averages a 0/1/2 code across countries. The pattern documents staggered diffusion of climate laws across the sample, supports designs that exploit staggered timing of adoption, and motivates the paper's heterogeneity checks (e.g., stronger or faster rises where institutional capacity and bank profitability are higher).

3.3. Controls

To comprehensively analyze the relationship between climate laws and financial stability, we incorporate control variables that account nonexclusively for key financial, economic, and institutional factors that may influence the banking sector's stability. These

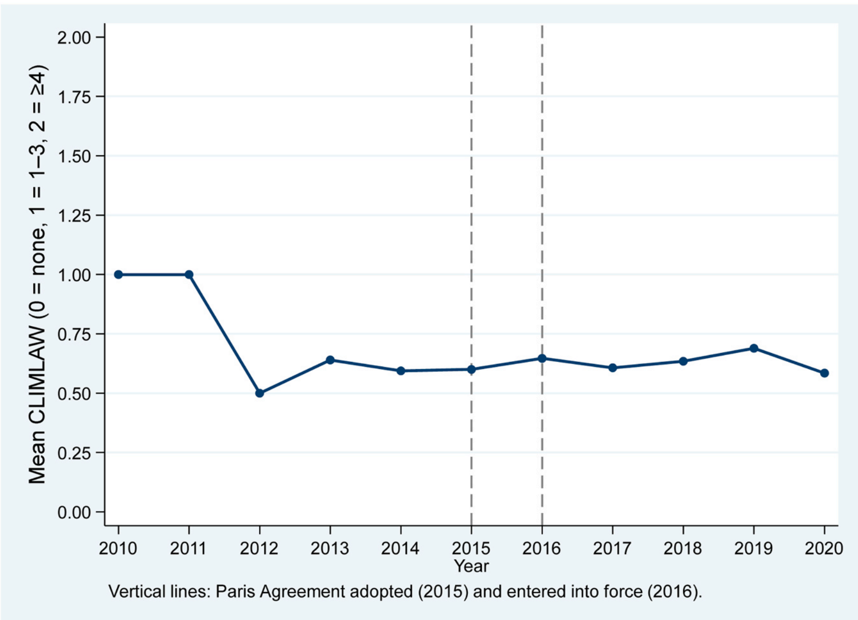

Fig. 1. Per-year mean CLIMLAW score.

controls partly ensure that the estimated effects of climate laws on financial stability are not confounded by other macroeconomic, financial, and governance-related characteristics. We include the following controls:

The financial market depth index (FMDPT) captures the development and liquidity of financial markets, where higher values indicate greater depth. This variable is sourced from the IMF Financial Development Database. A well-developed financial market provides stability and diversification opportunities for banks, reducing financial system fragility. Cantú and Chui (2019) show that greater financial market depth enhances financial resilience by improving access to liquidity and risk management tools in emerging markets. Similarly, inflation (INFL) is measured using the consumer price index annual percentage change, which accounts for macroeconomic stability. The data is obtained from the World Development Indicators. High inflation can erode the real value of financial assets, increase uncertainty, and destabilize the banking sector. The International Monetary Fund (IMF, 2025) highlights that inflationary pressures can lead to financial instability, particularly when central banks respond with aggressive interest rate hikes.

The banks' regulatory capital ratio (REGCAP) measures the proportion of a bank's capital to its risk-weighted assets, with higher values indicating more resilient banks that are better equipped to absorb financial shocks. The data is sourced from the World Economic Forum's Global Competitiveness Report. A well-capitalized banking system is less vulnerable to systemic risks, making this a crucial control for financial stability. The Bank for International Settlements (BIS, 2011) underscores that higher capital requirements help mitigate systemic risks and enhance the stability of financial institutions. Additionally, bank profitability (BROA) is represented by the return on assets (ROA, % after tax), which reflects a bank's profitability relative to its total assets. ROA is a widely used measure of bank performance, sourced from the World Development Indicators. More profitable banks are financially healthier and better positioned to manage financial downturns. Asteriou et al. (2020) find that higher profitability significantly reduces financial fragility and enhances bank stability.

Non-financial regulatory factors also play a role in financial stability. The conflict-of-interest regulation index (CONFINT) (1−10) measures the strictness of regulations addressing conflicts of interest in the financial sector. The data comes from the World Economic Forum's Global Competitiveness Report. Stronger regulations reduce moral hazard and insider abuse, enhancing financial stability by ensuring fair financial practices. The Federal Reserve Board (2024) emphasizes that well-enforced conflict-of-interest regulation improves investor confidence and reduce systemic risks in the financial sector. Likewise, the control of corruption index (CONCOR) (1−7) captures anti-corruption effectiveness, where higher values indicate stronger governance. This measure is obtained from the Worldwide Governance Indicators. Corruption can undermine financial stability by distorting financial decision-making, weakening regulatory enforcement, and increasing risk-taking in banks. Asteriou et al. (2020) provide empirical evidence that corruption significantly weakens bank profitability and stability, making this a crucial factor to control for in financial stability analyses.

Finally, policy stability (POLSTB) is measured using the Policy Stability Index (1−7), which reflects government consistency in policy implementation. This variable is sourced from the World Economic Forum's Global Competitiveness Report. Higher values indicate greater predictability in economic policies, reducing regulatory uncertainty and fostering a more resilient financial environment. The Federal Reserve Board (2024) notes that stable economic policies contribute to financial market confidence, which is essential for banking sector resilience. By integrating these controls, we account for key financial, economic, and institutional determinants of financial stability, ensuring that the observed relationship between climate laws and banking sector resilience is not driven by unrelated economic or regulatory influences.

The summary statistics in Table 2 highlight substantial cross-country variation in key variables. The financial stability measure (FINSTAB) has a mean of 17.49 with a wide standard deviation (10.33), ranging from −0.33–62.44, indicating significant disparities in banking sector stability. Climate law policy (CLIMLAW) has a mean of 0.58 and a standard deviation of 0.59, with most countries having some but not extensive climate legislation. Financial Market Depth (FMDPT) is relatively low on average (0.38), with values concentrated between 0.09 and 0.67. Inflation (INFL) varies widely (mean = 130.30, SD = 37.23), reflecting macroeconomic differences. Banking sector resilience, measured by Regulatory Capital Ratio (REGCAP, mean = 15.91 %) and Return on Assets (BROA, mean = 1.22 %), shows considerable spread, with some countries experiencing negative returns. Regulatory and governance indicators, such as Conflict of Interest Regulation (CONFINT, mean = 5.70) and Control of Corruption (CONCOR, mean = 0.30, SD = 1.06), display notable variation. Finally, Policy Stability (POLSTB, mean = 3.93) suggests moderate government predictability. These statistics emphasize heterogeneity in financial, macroeconomic, and institutional conditions, reinforcing the need for robust controls in empirical analysis.

Further, the correlation matrix in Table 3 highlights that Climate laws (CLIMLAW) show a small but significant correlation with

Table 2
Summary statistics.

	Count	Mean	SD	Min	P25	P50	P75	Max
FINSTAB	692	17.49	10.33	−0.33	10.21	15.63	20.67	62.44
CLIMLAW	692	0.58	0.59	0.00	0.00	1.00	1.00	2.00
FMDPT	692	0.38	0.33	0.00	0.09	0.26	0.67	1.06
INFL	692	130.30	37.23	97.75	109.32	116.87	136.96	154.43
REGCAP	692	15.91	3.58	7.77	13.42	15.45	17.86	30.58
BROA	692	1.22	1.70	−4.57	0.66	1.02	1.50	38.30
CONFINT	692	5.70	1.48	2.69	4.70	5.70	6.70	9.99
CONCOR	692	0.30	1.06	−1.46	−0.57	0.05	1.26	2.40
POLSTB	692	3.93	0.99	1.65	3.20	3.85	4.61	6.57

Note: The table reports the summary statistics of the variables used in the analysis.

financial stability (0.01). Financial market depth (FMDPT) is positively correlated with financial stability (0.16), reinforcing the role of developed financial systems in promoting stability, while inflation (INFL) is negatively associated (-0.10), indicating its destabilizing effect. Stronger governance, such as policy stability (0.27) and corruption control (0.16), is linked to higher financial stability, suggesting that institutional quality plays a crucial role in reducing systemic risk. Notably, bank profitability (BROA, −0.06) and regulatory capital ratio (REGCAP, −0.05) show weak or negative correlations, implying that higher capital or profitability does not always translate into greater stability. Additionally, financial market depth strongly correlates with governance indicators (e.g., policy stability, 0.45), indicating that better-regulated financial systems often coincide with stronger institutions. However, moderate correlations among independent variables suggest small potential multicollinearity risks (small VIF value, 1.60) and warranting robust estimation techniques for reliable regression results.

3.4. Estimation model

The empirical analysis employs a panel Ordinary Least Squares (OLS) model with country and year fixed effects to examine the relationship between climate laws and financial stability. The inclusion of country fixed effects accounts for time-invariant heterogeneity across countries, controlling for unobserved country-specific factors that could influence financial stability, such as structural economic differences, historical regulatory frameworks, or banking system characteristics (Greene, 2012). Meanwhile, year fixed effects capture global time-varying shocks that may affect financial stability across all countries, such as financial crises, global economic downturns, or international regulatory changes. The model is estimated with clustered standard errors at the country level, which corrects for heteroskedasticity and serial correlation within countries, ensuring that statistical inference remains robust (Angrist and Pischke, 2009). One of the primary advantages of the panel OLS model is its ability to control for both observed and unobserved heterogeneity while allowing for within-country comparisons over time, reducing omitted variable bias. However, a key limitation of the model is the potential endogeneity issue, where omitted variable bias, reverse causality, or measurement error may bias the estimated coefficients (Angrist and Pischke, 2009). To address this, further endogeneity analysis, including instrumental variable (IV) estimation, coefficient stability tests, and propensity score matching (PSM), will be conducted later in the study to assess the robustness of the results and strengthen causal inference. This empirical strategy is as follows:

$$FINSTAB_{it} = \beta_0 + \beta_1 CLIMLAW_{it} + \beta_2 X_{it} + \gamma_i + \delta_t + \varepsilon_{it} \quad (1)$$

where $FINSTAB_{it}$ represents financial stability, measured by the Z-score of the banking sector in country *i* at time *t*, with higher values indicating lower insolvency risk. The key independent variable, $CLIMLAW_t$, captures the number of climate-related laws and regulations in a country *i*. To account for other determinants of financial stability, the model includes a vector of control variables, X_{it}, incorporating financial, macroeconomic, and institutional factors. The model controls for country fixed effects (γ_i) to account for unobserved time-invariant country characteristics and year fixed effects (δ_t) to capture global economic shocks and regulatory trends, and e_{it} is the regression's error term. However, due to the inherent challenges in establishing causal relationships in observational data, we interpret the results as indicating the strength of association between climate laws and financial stability rather than definitive causal effects.

4. Results

4.1. Baseline effects

Table 4 presents the baseline regression results estimating the effect of CLIMLAW on FINSTAB while controlling for financial, macroeconomic, and institutional factors. The results are shown across four fixed effect specifications, progressively accounting for unobserved heterogeneity. The key finding is that climate laws have a positive and statistically significant impact on financial stability across all models, with the fully specified Model 4 showing a coefficient of 0.319 ($p < 0.05$). This suggests that stronger climate regulation policies are associated with a more stable banking sector, potentially by mitigating long-term environmental risks and

Table 3
Correlation matrix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
FINSTAB (1)	1.00								
CLIMLAW (2)	0.01**	1.00							
FMDPT (3)	0.16***	0.15***	1.00						
INFL (4)	−0.10**	−0.13***	−0.33***	1.00					
REGCAP (5)	−0.05	−0.08**	0.01	0.08**	1.00				
BROA (6)	−0.06	−0.10***	−0.23***	0.23***	0.14***	1.00			
CONFINT (7)	−0.01	0.03	0.37***	0.06*	0.21***	0.01	1.00		
CONCOR (8)	0.16***	0.06	0.36***	−0.42***	0.23***	−0.17***	0.29***	1.00	
POLSTB (9)	0.27***	−0.05	0.45***	−0.14***	0.29***	−0.09**	0.37***	0.39***	1.00
VIF	1.60								

Note: The table reports the pairwise correlations between variables and the regression's VIF mean value.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4
Baseline effects.

	(1)	(2)	(3)	(4)
CLIMLAW	0.379*	0.388*	0.358**	0.319**
	(0.623)	(0.626)	(0.145)	(0.138)
FMDPT	0.418	0.494	8.974**	9.553**
	(1.696)	(1.702)	(4.071)	(4.063)
INFL	−0.013	−0.012	−0.016***	−0.011***
	(0.009)	(0.009)	(0.004)	(0.004)
REGCAP	−0.343**	−0.313**	0.090	0.331***
	(0.136)	(0.141)	(0.087)	(0.114)
BROA	0.010	−0.019	0.306**	0.288**
	(0.206)	(0.198)	(0.150)	(0.141)
CONFINT	−0.744*	−0.731*	0.057	0.449*
	(0.398)	(0.404)	(0.211)	(0.256)
CONCOR	−0.552	−0.667	−1.266*	−1.254*
	(0.595)	(0.605)	(0.700)	(0.702)
POLSTB	3.839***	3.908***	1.002**	1.543***
	(0.588)	(0.596)	(0.404)	(0.448)
adj. R2	0.309	0.489	0.772	0.773
RMSE	9.832	9.859	1.743	1.691
F-test	9.131	4.995	.	.
Country FE	No	No	Yes	Yes
Year FE	No	Yes	No	Yes
N	692	692	692	692

Notes. The Table reports the baseline effects of climate law policy on financial stability. Additional control variables include macroeconomic and institutional variables. The sample period is 2013–2020. We use an OLS model with random and fixed effects and country-clustered standard errors. Model (1) includes random effects only. Model (2) includes year effects only. Model (3) includes country effects only. Model (4) includes country and year effects. Definition of variables is provided in the Appendix.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

promoting sustainable financial practices, thereby confirming hypothesis H1. These findings broadly align, but go beyond, with research showing that stronger regulatory frameworks enhance financial resilience (Demirgüç-Kunt and Detragiache, 2011). Climate-related regulations also improve market transparency, like corporate disclosure mechanisms that reduce systemic risks (Bushman and Smith, 2001; Francis et al., 2008). Moreover, the results support the view that institutional quality strengthens financial stability, particularly in developing economies vulnerable to climate risks (Nguyen and Phan, 2021). Overall, the findings confirm that climate laws function as macroprudential tools, reducing systemic exposure and financial distortions.

Among the control variables, financial market depth (FMDPT) exhibits a strong positive association with financial stability (9.553, $p < 0.05$), indicating that well-developed financial markets reduce banking sector risk by enhancing liquidity and risk-sharing mechanisms, consistent with prior findings on financial market resilience (Cantú and Chui, 2019). In contrast, inflation (INFL) has a significant negative impact (-0.011, $p < 0.01$), reinforcing the argument that macroeconomic instability weakens financial resilience by increasing uncertainty and eroding the real value of financial assets, in line with evidence that high inflation amplifies banking sector fragility (IMF, 2025). Additionally, higher bank regulatory capital (REGCAP) is positively linked to financial stability (0.331, $p < 0.01$), highlighting the role of capital buffers in absorbing financial shocks, supporting the principles of Basel III regulations (BIS, 2011). Bank profitability (0.288, $p < 0.05$) also contributes to financial stability, suggesting that more profitable banks can better manage risks and sustain operations, consistent with research on financial performance and banking sector resilience (Asteriou et al., 2020).

Institutional and governance factors significantly influence financial stability. Stronger conflict of interest regulation (CONFINT) is positively associated with financial stability (0.449, $p < 0.10$), suggesting that stricter regulatory frameworks reduce systemic risks by limiting financial misconduct, consistent with research emphasizing the role of financial regulation in reducing market inefficiencies (Federal Reserve Board, 2024). However, control of corruption (CONCOR) shows a counterintuitive negative impact (-1.254, $p < 0.10$), possibly due to short-term regulatory adjustments that disrupt financial operations in certain economies. This aligns with prior studies indicating that anti-corruption efforts can lead to initial financial instability before long-term benefits materialize (Asteriou et al., 2020). The most significant predictor in the model is policy stability (POLSTB), which has a large positive effect on financial stability (1.543, $p < 0.01$), reinforcing the view that consistent and predictable policies foster a more resilient banking sector by reducing regulatory uncertainty (Federal Reserve Board, 2024). These findings underscore the importance of institutional quality in shaping financial system resilience and suggest that well-designed regulatory frameworks enhance investor confidence and market efficiency.

Overall, the findings provide robust evidence that climate laws are positively associated with financial stability, supporting the argument that environmental policies contribute to financial system resilience. However, other factors such as policy stability, financial market depth, and macroeconomic stability have a more dominant influence on financial stability. The results suggest that while climate laws play a role in shaping financial stability, their effectiveness is enhanced when complemented by broader financial and regulatory reforms that strengthen the economic environment.

4.2. Indirect effects

Our estimates show a direct, positive, and statistically significant association between climate laws and bank stability. Theory, however, implies additional indirect pathways operating through macro-financial and institutional conditions that we proxy with several controls. First, climate statutes and implementing rules bolster disclosure and comparability, which lowers information asymmetry and strengthens market discipline, which are mechanisms long linked to safer banks via cheaper and more stable funding (Flannery, 2001; Nier and Baumann, 2006). Better disclosure can reduce the cost of capital by improving investors' assessments of cash-flow risk and covariance (Lambert et al., 2007), implying that countries where disclosure infrastructure and governance are stronger should see a larger transmission from law to stability. Second, laws that clarify transition pathways shift relative prices and eligibility, encouraging portfolio reallocation away from carbon-intensive borrowers; theory and evidence show that such policy-induced re-pricing changes investment and risk premia, thereby lowering banks' tail risk via reduced exposure to "brown" sectors (Acemoglu et al., 2012; Bolton and Kacperczyk, 2021; Pástor et al., 2022). Third, credible legislation reduces policy uncertainty, a known driver of volatility and risk premia (Baker et al., 2016; Pástor and Veronesi, 2012); in our setting, countries with higher baseline policy stability plausibly convert legal commitments into smoother credit and asset-quality dynamics. Finally, system-wide models and network stress-testing show how robust climate policy improves balance-sheet resilience and curbs contagion from "stranded-asset" shocks (Dafermos et al., 2018; Battiston et al., 2017). These works justify interpreting profitability, market depth, governance, and policy stability not as alternative "channels" competing with the law, but as contextual media through which law-induced information, pricing, and uncertainty effects propagate, consistent with our finding that the direct law coefficient remains positive and significant even as these conditions vary.

We therefore investigate whether, in addition to its direct effects, CLIMLAW interacts with key financial, economic, and institutional factors in shaping FINSTAB. Table 5 presents the results. Among the interaction terms, climate laws and bank profitability (CLIMLAW * BROA) exhibit a strong positive and significant effect (0.652, $p < 0.01$), indicating that the stabilizing effect of climate laws is amplified in countries where banks are more profitable. This suggests that financially healthy banks are better positioned to

Table 5
Indirect effects.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CLIMLAW	0.353*	0.391*	0.516**	0.451*	0.842**	0.362*	0.513**
	(0.178)	(0.500)	(0.597)	(0.239)	(0.614)	(0.132)	(0.602)
FMDPT	9.538**	9.574**	9.552**	9.292**	9.341**	9.371**	9.491**
	(4.066)	(4.065)	(4.067)	(3.877)	(4.057)	(4.055)	(4.040)
CLIMLAW * FMDPT	−0.087						
	(0.367)						
INFL	−0.011***	−0.011***	−0.011***	−0.007*	−0.011***	−0.011***	−0.011***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
CLIMLAW * INFL		−0.001					
		(0.003)					
REGCAP	0.331***	0.330***	0.338***	0.366***	0.329***	0.338***	0.335***
	(0.115)	(0.114)	(0.112)	(0.112)	(0.115)	(0.114)	(0.113)
CLIMLAW * REGCAP			−0.012				
			(0.038)				
BROA	0.288**	0.288**	0.287**	0.252**	0.289**	0.286**	0.288**
	(0.141)	(0.141)	(0.141)	(0.111)	(0.141)	(0.141)	(0.141)
CLIMLAW * BROA				0.652***			
				(0.146)			
CONFINT	0.451*	0.447*	0.435	0.544**	0.463*	0.456*	0.447*
	(0.257)	(0.258)	(0.267)	(0.251)	(0.258)	(0.256)	(0.255)
CLIMLAW * CONFINT					0.091*		
					(0.095)		
CONCOR	−1.249*	−1.255*	−1.248*	−1.087	−1.258*	−1.148*	−1.272*
	(0.704)	(0.704)	(0.702)	(0.690)	(0.703)	(0.716)	(0.701)
CLIMLAW * CONCOR						0.116	
						(0.143)	
POLSTB	1.540***	1.538***	1.554***	1.500***	1.488***	1.525***	1.562***
	(0.450)	(0.447)	(0.444)	(0.442)	(0.445)	(0.456)	(0.442)
CLIMLAW * POLSTB							−0.049
							(0.157)
adj. R2	0.770	0.771	0.773	0.774	0.773	0.774	0.773
RMSE	1.692	1.692	1.692	1.655	1.691	1.691	1.692
Country FE	No	No	No	No	No	No	No
Year FE	No	No	No	No	No	No	No
N	692	692	692	692	692	692	692

Notes. The Table reports the indirect effects of climate law policy on financial stability based on the interactions between climate law policy and each of the remaining regressors. The sample period is 2013–2020. We use an OLS model with random and fixed effects and country-clustered standard errors. Definition of variables is provided in the Appendix.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

integrate climate policies into their risk management strategies, potentially due to stronger capital reserves and better risk absorption capacities (Chen and Lin, 2024). Additionally, the interaction between climate laws and conflict of interest regulation (CLIMLAW * CONFINT) is positive and marginally significant (0.091, $p < 0.10$), implying that stricter regulatory frameworks strengthen the positive impact of climate laws on financial stability by enhancing compliance and reducing risks associated with regulatory capture (Bolleyer et al., 2020).

Other interaction effects, however, do not exhibit statistical significance. The interaction between climate laws and financial market depth (CLIMLAW * FMDPT, −0.087) is insignificant, suggesting that financial market development does not meaningfully alter the effect of climate laws on banking sector stability. Similarly, the interaction between climate laws and inflation (CLIMLAW * INFL, −0.001), regulatory capital (CLIMLAW * REGCAP, −0.012), and policy stability (CLIMLAW * POLSTB, −0.049) do not significantly influence the relationship between climate policies and financial stability. These results imply that climate regulations operate independently of macroeconomic stability, financial sector depth, and policy predictability in shaping financial resilience. The interaction between climate laws and corruption control (CLIMLAW * CONCOR, 0.116), although positive, is statistically insignificant, suggesting that anti-corruption measures alone may not be sufficient to enhance the effectiveness of climate laws in stabilizing financial systems. This could be because corruption control mechanisms may take time to translate into meaningful improvements in governance and regulatory enforcement, limiting their short-term impact on financial stability.

The findings in Table 5 confirm that climate laws contribute positively to financial stability, but their effectiveness is enhanced in certain financial and institutional environments, thereby confirming hypothesis H2. The strongest interaction effect is with bank profitability, suggesting that banks with higher profitability levels are better equipped to internalize climate-related financial risks and adjust their strategies accordingly. Additionally, stricter conflict of interest regulation marginally strengthens the impact of climate laws, highlighting the role of robust governance frameworks in ensuring effective implementation of climate policies. However, the lack of significant interaction with financial market depth, inflation, regulatory capital, and policy stability suggests that climate policies influence financial stability through independent channels rather than through broad macro-financial conditions. This implies that climate laws have a more direct rather than conditional effect on bank resilience.

4.3. *Disaggregated effects*

Disaggregating climate legislation is essential for credible inference and policy realism. A single count conflates instruments that differ sharply in legal form, enforceability, and the mechanisms through which they operate. For example, framework/statutory laws

Table 6
Disaggregated effects.

	(1)	(2)	(3)
CLIMLAW1	0.316**		
	(0.128)		
CLIMLAW2		0.065*	
		(0.032)	
CLIMLAW3			0.029
			(0.045)
FMDPT	8.969**	9.843**	9.553**
	(4.013)	(4.132)	(4.125)
INFL	−0.012***	−0.013***	−0.012***
	(0.004)	(0.004)	(0.004)
REGCAP	0.301***	0.351***	0.339***
	(0.109)	(0.116)	(0.115)
BROA	0.279**	0.282**	0.281**
	(0.139)	(0.137)	(0.138)
CONFINT	0.460*	0.586**	0.464*
	(0.247)	(0.246)	(0.245)
CONCOR	−1.188*	−1.336*	−1.178*
	(0.694)	(0.703)	(0.702)
POLSTB	1.622***	1.522***	1.606***
	(0.463)	(0.458)	(0.469)
adj. R2	0.974	0.973	0.973
RMSE	1.674	1.689	1.692
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	686	686	686

Notes. The Table reports the baseline effects of climate law policy on financial stability, after disaggregating between climate laws, climate policies/executive regulations, and CLIMATE mitigation laws. Additional control variables include macro-economic and institutional variables. The sample period is 2013–2020. We use an OLS model with fixed effects. We cluster standard errors at the country level. Model (1) includes the effects of climate laws only (CLIMLAW1). Model (2) includes the effects of climate policies/executive regulations only (CLIMLAW2). Model (3) includes the effects of CLIMATE mitigation laws (CLIMLAW3). Definition of variables is provided in the Appendix.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

can rewire governance, disclosure, and supervisory coordination, whereas executive regulations typically operationalize existing mandates, and mitigation-specific acts target sectoral emissions. Lumping these together risks attenuation and obscures which levers matter for bank stability. We therefore separate between climate laws (framework/statutory) (CLIMLAW1), climate policies/executive regulations (CLIMLAW2), and mitigation laws (CLIMLAW3), estimating each within the same country- and year-fixed-effects design so magnitudes are comparable.

In Table 6, the disaggregated results show that framework/statutory climate laws (CLIMLAW1) have the strongest and statistically robust association with banking stability ($\beta = 0.316$, $p < 0.05$). Policies/executive regulations (CLIMLAW2) have a positive but only weakly significant effect ($\beta = 0.065$, $p < 0.10$), consistent with a complementary, lower-intensity effect once a legal backbone exists. By contrast, mitigation-only laws (CLIMLAW3) have a statistically insignificant effect ($\beta = 0.029$, $p > 0.10$). These estimates show that different legal instruments matter differently, confirming hypothesis H3, and imply that the stability gains in the sample are driven primarily by comprehensive, framework-level statutes; secondary rules provide incremental support, while mitigation provisions alone do not yield a detectable improvement in the banking system's stability.

5. Endogeneity

The analysis may face endogeneity risks due to reverse causality, omitted variable bias, and measurement error. Reverse causality arises if financially stable countries are more likely to implement climate laws, rather than climate laws driving financial stability. Omitted variable bias may occur if unobserved factors such as political stability or global economic shocks simultaneously influence both climate laws and financial stability. Additionally, measurement error in the reporting of climate laws or financial stability indicators could lead to biased estimates, affecting the reliability of the results. To address these risks, the paper employs instrumental variable methods, the Oster test of coefficient stability, and propensity score matching to strengthen causal inference and ensure robustness of the findings. Table 7 presents the results.

Table 7
Endogeneity.

	(1)	(2)	(3)	(4)
CLIMLAW	0.129**	0.531***	0.319**	
	(6.267)	(0.193)	(0.138)	
FMDPT	5.186*	8.382**	9.553**	
	(8.169)	(3.767)	(4.063)	
INFL	−0.023	−0.011***	−0.011***	
	(0.043)	(0.004)	(0.004)	
REGCAP	1.056**	0.329***	0.331***	
	(0.524)	(0.104)	(0.114)	
BROA	3.257*	0.296**	0.288**	
	(1.975)	(0.132)	(0.141)	
CONFINT	0.585*	0.452*	0.449*	
	(0.891)	(0.243)	(0.256)	
CONCOR	−2.669	−1.225*	−1.254*	
	(1.773)	(0.645)	(0.702)	
POLSTB	6.108***	1.427***	1.543***	
	(2.366)	(0.426)	(0.448)	
TREATED (PSM)				0.363**
				(0.884)
First-stage				
DISASTER	−0.165**	−0.133**		
	(−3.36)	(0.056)		
Kleibergen-Paap_F	10.757			
Second stage				
adj. R2	0.649		0.673	
F-stat (overall)	12.770	.	.	
Kleibergen-Paap_LM (pv)	3.810 (0.051)			
Stock-Wright_stat (pv)	2.943 (0.086)			
Wald Chi2		63214.51		
Atanrho (pv)		0.193 (0.147)		
Beta			0.326**	
Delta			0.492	
Mean bias (%)				6.480
N	537	619	692	546

Notes. The table reports the results of the endogeneity analysis. The outcome variable is FINSTAB. The key independent variable is CLIMLAW. The sample period is 2013–2020. Model (1) uses an IV model with the 2SLS estimator. Model (2) uses an IV model with the CMP estimator. The external instrument used is the number of landslide disasters (DISASTER). Model (3) uses the Oster (2019) test of coefficient stability. Model (4) uses propensity score matching.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.1. Instrumental variables

The instrumental variable (IV) analysis uses both the two-stage least squares method (2SLS) and the conditional mixed process method (CMP) based on the maximum likelihood estimator (Roodman, 2011). The 2SLS model detects endogeneity by estimating the endogenous regressor in the first stage and substituting its predicted values in the second stage, whereas the conditional mixed process (CMP) model allows for simultaneous estimation of multiple equations, accommodating recursive systems, non-linear relationships, and different types of endogenous regressors, making it more flexible in handling complex endogeneity structures.

We instrument climate-law adoption using exogenous geophysical landslide susceptibility (number of natural disasters from landslides - DISASTER), sourced from the EM-DAT International Disaster Database. arguing that countries structurally more exposed to climate-related physical risks face stronger international and domestic pressure to legislate. To guard the exclusion restriction, we include country and year fixed effects and show strong first-stage F-statistics.

Exogenous geophysical exposure to landslide risk satisfies the relevance and exclusivity conditions for a valid instrument. The relevance condition requires that the instrument be strongly correlated with climate laws. Landslides, as climate-related disasters, increase public and governmental awareness of environmental risks, prompting regulatory responses. Countries that experience more frequent and severe landslides are more likely to enact climate-related policies and regulations as part of their adaptation and mitigation strategies. Hazlett and Mildenberger (2021) find that experiencing natural disasters can heighten public awareness of climate change, thereby increasing support for public policies related to climate change, including renewable energy research and CO_2 emission limits. This suggests that countries experiencing more frequent climate-related disasters, like landslides, are more likely to implement climate laws as a response to heightened public concern and the perceived need for regulatory action. Further, natural disasters often trigger stronger climate governance because governments react to environmental shocks by implementing preventative and resilience-enhancing policies, including climate laws (Khurana et al., 2022). Therefore, landslide disasters serve as a strong predictor of climate law adoption, meeting the relevance requirement.

The exclusivity condition requires that landslides affect financial stability only through their impact on climate laws and not through any other direct channel. This assumption is plausible because landslides, unlike broader economic shocks such as financial crises or policy changes, are localized environmental events. Pahl and Wiedenhofer (2024) argue that while natural disasters can prompt policy changes, their direct economic impacts are typically localized and sector-specific, rather than systemic. This implies that the occurrence of landslides is unlikely to have a direct, widespread impact on a country's overall financial stability. Therefore, the instrument's influence on financial stability is plausibly mediated exclusively through the adoption of climate laws, satisfying the exclusivity condition. While they may have short-term economic consequences, their direct impact on the banking sector is typically limited, especially when controlling for macroeconomic conditions, financial development, and governance factors.

We report first-stage strength, over-identification tests where applicable, and plausibly exogenous bounds that allow small violations of the exclusion restriction. In the 2SLS estimator (Model 1), the first-stage regression confirms that the instrument (DISASTER) significantly predicts climate laws (CLIMLAW) with a coefficient of -0.165 ($p < 0.05$), satisfying the relevance condition for IV estimation. The Kleibergen-Paap F-statistic is 10.757, exceeding the conventional threshold of 10, indicating that the instrument is not weak. The Kleibergen-Paap LM test statistic (3.810, $p = 0.051$) suggests that the model is not underidentified at the 10 % level, meaning the instruments provide enough information to explain the endogenous variables. In the second stage, the coefficient on climate laws is 0.129 ($p < 0.05$), showing a strong positive effect of climate laws on financial stability. The overall F-statistic (12.770) confirms that the regression is jointly significant. These results suggest that OLS underestimates the effect of climate laws, and that stronger environmental policies significantly enhance financial stability by reducing climate-related risks.

The CMP estimator (Model 2) similarly finds that DISASTER is a significant predictor of climate laws (-0.133, $p < 0.05$). The Wald Chi^2 statistic (63214.51, $p < 0.01$) indicates a highly significant model fit, confirming that the estimation procedure captures important relationships. However, the insignificant Atanrho statistic (0.193, $p = 0.147$) suggests that endogeneity is less severe in line with the 2SLS model, meaning that climate laws may not be endogenous. The CMP coefficient on climate laws is 0.531 ($p < 0.05$), still positive and significant, but slightly smaller than the 2SLS estimate. This indicates that while climate laws positively impact financial stability, the effect size may be somewhat smaller when controlling for multiple sources of error correlation. Overall, both models confirm the positive and significant role of climate laws in strengthening financial stability, but the magnitude of the effect depends on the estimation method, highlighting the importance of addressing endogeneity concerns carefully.

5.2. Coefficient stability

The Oster (2019) test of coefficient stability in Model 3 of Table 7 evaluates whether omitted variable bias could explain the observed relationship between CLIMLAW and FINSTAB. The test assesses the presence of omitted variable bias by examining how coefficient stability changes when observed controls are added, using R-squared values to infer the potential impact of unobserved variables. It estimates delta ($\delta = 0.492$) and beta (0.326, $p < 0.05$), which indicate a low likelihood of endogeneity and a significant effect of climate laws on financial stability. A delta value less than 1 shows that the selection on unobservables is weaker than selection on observables. This implies that omitted variables are less influential in driving the results than the included regressors, making the estimate more reliable. Additionally, the stability of beta across different model specifications confirms that the estimated coefficient remains stable even after adding control variables, suggesting that omitted variable bias is unlikely to drive the results. These findings validate the causal interpretation of the impact of climate laws on financial stability, strengthening the argument that stronger environmental policies enhance financial resilience rather than being an artifact of selection bias or unobserved confounders.

5.3. Propensity score matching

The Propensity Score Matching (PSM) analysis mitigates endogeneity concerns by matching countries with and without climate laws based on similar observable characteristics, reducing selection bias in estimating their effect on FINSTAB. Model (4) of Table 7 presents results using nearest-neighbor matching, where countries with a number of climate laws above the global sample median are classified as the treatment group (representing nations with more developed and supportive climate policies), while those below the median form the control group (indicating less comprehensive climate support). The treatment effect, measured by the coefficient on the treatment variable (Treated) from the propensity score matching procedure, captures the impact of stronger climate laws on financial stability. The Treated coefficient (0.363, $p < 0.05$) indicates a statistically significant positive impact of stronger climate laws on financial stability. This suggests that countries with climate laws exhibit greater financial stability compared to observationally similar countries without such laws. However, the Mean Bias statistic is 6.480, which is below the conventional 10 % threshold, suggesting that little imbalance exists between treated and control groups. The significant Treated coefficient supports the robust effect of climate laws on financial stability, indicating that the relationship is unlikely to be purely driven by selection bias. These findings reinforce the argument that climate laws play a meaningful role in enhancing financial stability, further strengthening the policy case for their adoption as part of broader financial resilience strategies.

6. Robustness

To further validate the findings and ensure the robustness of the estimated effects, we conduct additional sensitivity tests to assess the stability of results under different specifications. This includes evaluating alternative definitions of financial stability, using different sets of control variables, and examining subsamples of countries based on financial development or regulatory strength. Incorporating new controls related to climate vulnerability, economic shocks, and financial regulation stringency would further help rule out omitted variable bias. Furthermore, we apply dominance analysis to compare the relative explanatory power of climate laws against other key determinants of financial stability, providing a deeper understanding of their contribution.

6.1. Sensitivity analysis

Table 8 presents sensitivity tests to assess the robustness of the baseline results under alternative financial stability measures, climate-related financial policy definitions, and different sample structures. In Model 1, financial stability is measured using non-performing loans (percent of total gross loans) (NPL) using data from the World Bank, with a negative and significant coefficient

Table 8
Sensitivity tests.

	(1)	(2)	(3)	(4)	(5)
CLIMLAW	−0.174**		0.078**	0.237**	0.289**
	(0.083)		(0.014)	(0.182)	(0.180)
CLIMPOL		0.028**			
		(0.014)			
FMDPT	−0.191*	7.444*	7.444*	3.365	31.376***
	(1.330)	(4.248)	(4.248)	(3.614)	(6.930)
INFL	0.010	−0.011**	−0.011**	−0.009*	0.005
	(0.008)	(0.005)	(0.005)	(0.005)	(0.004)
REGCAP	−0.044*	0.542***	0.542***	0.572***	0.004
	(0.139)	(0.131)	(0.131)	(0.151)	(0.125)
BROA	−0.014	0.204**	0.204**	0.224**	1.618***
	(0.017)	(0.083)	(0.083)	(0.093)	(0.171)
CONFINT	0.405*	0.004	0.004	0.390	0.092
	(0.207)	(0.261)	(0.261)	(0.431)	(0.242)
CONCOR	0.580*	−0.404	−0.404	−1.951**	3.434***
	(0.437)	(0.765)	(0.765)	(0.951)	(1.006)
POLSTB	−1.413***	0.730	0.730	1.267**	0.192
	(0.325)	(0.519)	(0.519)	(0.514)	(0.626)
adj. R2	0.744	0.772	0.772	0.776	0.779
RMSE	1.183	1.703	1.703	1.750	1.136
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	701	512	512	456	236

Notes. The table reports the baseline effects after applying alternative variable measures and sample structures. The sample period is 2013–2020. We use an OLS model with fixed effects and country-clustered standard errors. Model (1) uses an alternative measure of financial stability based on bank non-performing loans (% of total gross loans) (NPL). Model (2) uses an alternative independent variable measure, the climate-related financial policy index (CLIMPOL). Model (3) uses an alternative sample structure that excludes the country with the largest financial stability score, i.e., Jordan. Model (4) uses an alternative sample structure that includes only the developed countries. Model (5) uses an alternative sample structure that includes only the developing countries.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

on CLIMLAW (-0.174, $p < 0.05$). Because higher NPL indicates lower stability, coefficients on CLIMLAW are expected to be negative. This suggests that stronger climate laws are associated with lower NPL ratios, meaning banks in countries with more climate policies experience fewer loan defaults and lower financial distress (World Bank, 2022), thus confirming hypothesis H4 regarding asset-quality cross-check. This result is consistent with the argument that climate laws reduce financial risks by fostering a more stable regulatory environment and encouraging long-term risk management by financial institutions. We emphasize that other relevant measures of stability, such as sovereign credit risk (e.g., CDS/EMBI) and capital-market volatility are conceptually distinct from banking stability. They capture fiscal/sovereign and market-wide stress, respectively, and do not directly measure bank insolvency risk; they can move for reasons orthogonal to bank balance sheets (e.g., commodity shocks, geopolitics, global liquidity). Accordingly, we retain the banking Z-score as the primary outcome and add NPL (% of gross loans) as Model 1 to provide a second, bank-centric asset-quality metric.

In Model 2, an alternative measure of climate-related financial policy (CLIMPOL) is used to assess whether the results depend on the specific definition of climate laws. CLIMPOL is a continuous variable that measures the extent of a country's engagement in climate-related financial planning and policy implementation (D'Orazio and Thole, 2022). The coefficient is positive and statistically significant (0.028, $p < 0.05$) albeit smaller in magnitude, indicating that climate-related financial policies, regardless of their specific formulation, contribute positively to financial stability. This reinforces the validity of the baseline findings, suggesting that the effect of climate policies is not an artifact of measurement but reflects a broader systemic impact on financial resilience (Nguyen and Phan, 2021).

Model 3 tests whether the results are driven by outliers by excluding Jordan, the country with the highest financial stability score. The coefficient on CLIMLAW remains significant (0.078, $p < 0.05$), indicating that the relationship between climate laws and financial stability holds even when extreme financial stability values are removed from the sample. This strengthens the argument that climate laws have a broad and consistent impact across countries, rather than being driven by a single highly stable nation (Financial Stability Board, 2020).

Model 4 focuses on developed countries only, showing a positive and significant effect of climate laws on financial stability (0.237,

Table 9
Additional controls.

	(1)	(2)	(3)
CLIMLAW	0.266**	0.321*	0.319**
	(0.139)	(0.169)	(0.138)
FMDPT	10.468**	8.830*	9.553**
	(4.212)	(4.944)	(4.063)
INFL	−0.010**	−0.021**	−0.011***
	(0.004)	(0.008)	(0.004)
REGCAP	0.308***	0.653	0.331***
	(0.113)	(0.400)	(0.114)
BROA	0.292**	0.208**	0.288**
	(0.142)	(0.086)	(0.141)
CONFINT	0.379	1.114	0.449*
	(0.253)	(1.415)	(0.256)
CONCOR	−1.183*	−0.524	−1.254*
	(0.695)	(0.962)	(0.702)
POLSTB	1.598***	7.975***	1.543***
	(0.442)	(2.087)	(0.448)
MCRQUAL	0.517**		
	(0.221)		
FINAFF	0.479**		
	(0.236)		
DIGADPT		4.081***	
		(7.482)	
LGADAPT		5.844	
		(3.545)	
FRACETH			−1.803*
			(75.493)
FRACRLG			−6.197**
			(7.622)
adj. R2	0.773	0.774	0.773
RMSE	1.682	1.651	1.691
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	692	521	692

Notes. The table reports the baseline effects of CLIMLAW on FINSTAB after adding new controls in separate groups. The sample period is 2013–2020. We use an OLS model with fixed effects and country-clustered standard errors. Model (1) controls for the effect of additional macroeconomic and financial conditions (MCRQUAL, FINAFF). Model (2) controls for the effect of additional technological conditions (DIGADPT, LGADAPT). Model (3) controls for the effect of additional social conditions (FRACETH, FRACRLG).

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

$p < 0.05$). This suggests that even in highly regulated financial environments with strong institutions, climate laws provide an additional stabilizing effect. This could be because developed countries have more sophisticated regulatory mechanisms that allow climate laws to integrate effectively into financial governance, reinforcing the argument that climate policies complement existing financial stability frameworks rather than duplicating them (European Central Bank, 2022). In contrast, Model 5 focuses on developing countries only, revealing a somewhat stronger effect of climate laws (0.289, $p < 0.01$). This suggests that climate regulations play a particularly crucial role in stabilizing financial systems in emerging economies, where financial markets are more vulnerable to climate-related risks. Ayele and Fisseha (2024) argue that in developing economies climate-induced disruptions pose significant threats to financial stability. Given that developing countries often experience weaker financial oversight and higher exposure to climate shocks, this result supports the idea that climate policies serve as an essential risk mitigation tool in fragile financial systems (Wang and Zhang, 2023).

Overall, the sensitivity tests confirm that climate laws have a robust and significant effect on financial stability, across different financial stability measures, alternative policy definitions, and varying sample restrictions. The stronger effect in developing countries highlights the importance of climate policies in less stable financial environments, reinforcing the policy relevance of integrating climate laws into financial stability frameworks worldwide.

6.2. *Additional control variables*

To ensure that the relationship between climate laws (CLIMLAW) and financial stability (FINSTAB) is not driven by omitted variable bias, Table 9 introduces additional control variables in three separate groups, each capturing different dimensions of macroeconomic, technological, and social conditions that could influence financial stability, as well as containing collinearity risk.

Model 1 adds financial market efficiency (MCRQUAL) and financial access (FINAFF) from the World Economic Forum's Global Competitiveness Report, both of which play a critical role in financial stability. A well-functioning financial market enables banks to absorb economic shocks and manage risks effectively, reducing systemic vulnerabilities. If climate laws indirectly improve financial market efficiency, failing to control for these factors could overstate their effect on financial stability. Cantú and Chui (2019) highlight that financial market development enhances resilience and strengthens financial stability by introducing new tools for raising funds and managing risks. Even after including financial market efficiency and access as controls, the coefficient on climate laws remains positive and significant (0.266, $p < 0.05$). This finding suggests that climate laws contribute to financial stability beyond their indirect effect through financial market development. The minimal reduction in the coefficient size indicates that the impact of climate policies is not solely a function of an improved financial market environment but also stems from broader regulatory and risk management mechanisms. Among the new controls, financial market efficiency (MCRQUAL) has a positive and significant effect (0.517, $p < 0.05$), confirming that greater efficiency in financial markets supports banking sector stability. Similarly, financial access (FINAFF) exhibits a positive and significant effect (0.479, $p < 0.10$), reinforcing the idea that expanding access to financial services helps mitigate systemic risks by improving liquidity and credit availability.

Model 2 introduces technological controls (DIGADPT, LGADAPT) from the World Bank and the World Economic Forum, respectively, to evaluate whether the financial stability effects of climate laws are influenced by digital adoption and regulatory adaptability to digital business models. As fintech, digital transactions, and AI-driven risk assessment continue to transform the financial sector, institutions are increasingly adapting to technological changes that may interact with climate regulations. By incorporating these controls, the model ensures that the observed relationship between climate laws and financial stability is not merely a byproduct of digital transformation in financial markets. Risman et al. (2021) highlight that digital finance technology, including mobile banking and internet access, significantly enhances financial stability by improving efficiency and expanding financial inclusion. After controlling for digital adoption (DIGADPT) and the adaptability of legal frameworks to digital business models (LGADAPT), the coefficient on climate laws remains positive and significant at 0.321 ($p < 0.05$). The slightly higher coefficient compared to Model 1 suggests that part of the effect of climate laws on financial stability may be enhanced by technological adoption. However, the persistence of statistical significance confirms that climate laws influence financial stability through multiple mechanisms rather than relying solely on digital transformation. Among the new controls, digital adoption (DIGADPT) has a strong positive and highly significant effect (4.081, $p < 0.01$), reinforcing the idea that higher digitalization enhances financial stability by increasing operational efficiency, improving risk assessment, and broadening financial inclusion. Likewise, the adaptability of legal frameworks to digital business models (LGADAPT) also shows a positive and significant effect (5.844, $p < 0.05$), suggesting that countries with more adaptable legal frameworks for digital finance experience greater financial stability due to stronger regulatory alignment with evolving financial technologies.

Model 3 incorporates measures of social fractionalization (FRACETH, FRACRLG) from Alesina et al. (2003), which capture ethnic and religious diversity, respectively. These factors can influence institutional quality, governance efficiency, and financial regulation enforcement. Countries with higher social fragmentation may experience weaker institutions, inconsistent financial policy implementation, and increased regulatory uncertainty, all of which can impact the effectiveness of climate laws. If social fractionalization affects policy effectiveness, omitting these variables could bias the estimated impact of climate laws on financial stability. Alesina et al. (2003) provide comprehensive data on ethnic and religious fractionalization and examine their implications for economic performance and governance. After controlling for ethnic (FRACETH) and religious (FRACRLG) fractionalization, the coefficient on climate laws remains positive and significant (0.319, $p < 0.05$). This result suggests that climate laws may have a strong stabilizing financial system effect in countries with higher social fragmentation, potentially because these regulations provide a structured policy framework that compensates for weak institutional cohesion. The findings indicate that climate laws enhance financial stability even in diverse and institutionally weaker environments, reinforcing their role as a critical regulatory tool across varying political and governance contexts. Among the new controls, ethnic fractionalization (FRACETH) has a negative and significant effect (-1.803, $p < 0.05$), showing that greater ethnic diversity, which can sometimes lead to governance challenges, is associated with lower financial stability. Similarly, religious fractionalization (FRACRLG) also exhibits a negative effect (-6.197, $p < 0.10$), suggesting that greater religious diversity may contribute to institutional complexity, which can influence financial sector stability. These results highlight that sociopolitical structures play a role in shaping financial resilience, emphasizing the importance of strong policy frameworks, such as climate laws, in mitigating financial instability in fragmented societies.

The results in Table 8 confirm that climate laws have a robust positive effect on financial stability, even after controlling for additional macroeconomic, technological, and social conditions. The significant and stable coefficient on CLIMLAW across all models suggests that the relationship between climate laws and financial stability is not driven by financial market efficiency, digital adoption, or social cohesion alone. The slightly lower coefficient in Model 2 (digital controls) suggests that technological factors mediate part of the impact, while the higher coefficient in Model 3 (social controls) suggests that climate laws may be particularly effective in fragmented societies.

6.3. Dominance analysis

Dominance analysis assesses the relative importance of explanatory variables in explaining financial stability, providing a more comprehensive understanding of which factors contribute most to model fitness. Unlike traditional regression methods that focus only on statistical significance, dominance analysis ranks variables based on their contribution to the model's explanatory power. This approach is particularly useful in this study because financial stability is influenced by a combination of economic, financial, and institutional factors, and dominance analysis helps determine whether climate laws (CLIMLAW) are among the most influential drivers compared to other key variables. Table 10 presents the results.

Model 1 considers the full sample. Climate laws (CLIMLAW) exhibit a dominance value of 0.0063, confirming their strong contribution to financial stability across different economic contexts. This suggests that, regardless of differences in financial development, institutional strength, or climate vulnerability, climate laws significantly enhance financial resilience. Notably, climate laws outperform traditional macroeconomic variables, such as inflation (0.0036) and bank profitability (0.0007), in explaining financial stability. This underscores their role as a critical policy that supports long-term financial resilience beyond short-term macroeconomic fluctuations.

Model 2 focuses on developed countries only. Climate laws show a lower dominance value (0.0053) compared to factors such as financial market efficiency (0.0111) and bank capital strength (0.0195). This suggests that, while climate laws contribute positively to financial stability, their impact is overshadowed by advanced financial markets and strongly capitalized financial institutions. The results imply that in these economies, financial market efficiency, governance quality, and capital adequacy play a more dominant role. However, the fact that climate laws still hold a non-negligible dominance value suggests that they provide additional financial protection, particularly against climate transition risks, reinforcing their importance as a complementary regulatory tool in highly developed financial systems.

Model 3 focuses on developing countries only. In contrast, climate laws have the highest dominance value (0.0313) in developing countries, surpassing all other regressors, except financial depth (0.0458). This finding highlights the critical role of climate regulations in financially vulnerable economies, where banks and financial markets face greater exposure to climate-related risks and economic instability. Unlike in developed economies, where financial stability depends more on market efficiency, developing countries benefit significantly from the regulatory certainty provided by climate laws. This suggests that implementing climate policies is a key strategy for reducing financial risks in emerging economies, where financial systems are less resilient to external shocks and where climate-related events have more severe financial consequences.

The dominance analysis confirms that climate laws play a key role in financial stability, but their relative importance varies across country groups. These findings highlight the importance of prioritizing climate laws in emerging economies, where they function as a

Table 10
Dominance analysis.

	(1)	(2)	(3)
CLIMLAW	0.0063	0.0053	0.0313
FMDPT	0.0098	0.0111	0.0458
INFL	0.0036	0.0238	0.0015
REGCAP	0.0085	0.0195	0.0009
BROA	0.0007	0.0005	0.0034
CONFINT	0.0058	0.0185	0.0229
CONCOR	0.0110	0.0173	0.0042
POLSTB	0.0645	0.1008	0.0043
Fit-stat	0.104	0.194	0.114
N	701	463	238

Notes. The table presents the results of dominance analysis, based on each regressor's contribution to overall model fit. Model (1) shows the dominant effect of each of the baseline regressors for the entire sample. Model (2) shows the dominant effect of each of the total number of regressors for developed countries only. Model (3) shows the dominant effect of each of the total number of regressors for developing countries only.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

primary stabilizing force in less developed financial markets. Meanwhile, in advanced economies, climate laws should be integrated with broader financial regulations to ensure they complement existing stability mechanisms rather than serve as the primary driver of financial resilience.

7. Channels of influence

Understanding the mechanisms through which climate laws affect financial stability is crucial for policy design and regulatory effectiveness. While previous findings confirm that climate laws improve financial stability, identifying specific channels helps clarify how and under what conditions this relationship operates. We identify three such mechanisms: Financial literacy regarding risk diversification, business disclosure, and regulatory bank supervision. Table 11 presents the results of modelling the effects of these mitigation mechanisms.

First, financial literacy regarding risk diversification (FINLITR), sourced from the S&P Global Financial Literacy Survey, plays a crucial role in mitigating financial instability by enhancing individuals' understanding of financial risk and diversification, which are key components of market resilience. Climate laws often introduce complex financial regulations, and higher financial literacy enables market participants to adapt more effectively, reducing systemic financial risks. Empirical evidence supports this relationship, showing that higher financial literacy levels correlate with lower financial fragility and improved risk management practices (Lusardi and Mitchell, 2014; AlSuwaidi and Mertzanis, 2024). In Model 1, the interaction term CLIMLAW × FINLITR is positive and significant (1.758, $p < 0.05$), indicating that higher financial literacy strengthens the positive effect of climate laws on financial stability. This aligns with theoretical expectations, as financially literate market participants better understand and adapt to regulatory adjustments, reducing financial vulnerability. Additionally, the standalone coefficient of CLIMLAW remains positive and significant (1.140, $p < 0.01$), confirming that climate laws independently contribute to financial stability, with financial literacy further amplifying this effect. Financial education is important in maximizing the effectiveness of climate regulations, as countries with higher financial literacy regarding risk diversification are better positioned to integrate climate-related financial policies, thereby enhancing financial system resilience.

Second, business disclosure (BDISCL), obtained from the World Bank's Doing Business Report, plays a critical role in mitigating financial instability by improving corporate transparency and reducing information asymmetry. Climate laws may enhance financial stability by strengthening firms' disclosure of climate-related financial risks, enabling investors, creditors, and regulators to make better-informed decisions. Empirical research confirms that greater corporate disclosure reduces market volatility and enhances investor confidence, fostering more resilient financial markets (Bushman and Smith, 2001; Francis, Nanda, and Olsson, 2008). Transparency in financial reporting helps market participants anticipate potential risks, reduce uncertainty, and reinforce trust in financial institutions. In Model 2, the interaction term CLIMLAW × BDISCL is positive and statistically significant (0.114, $p < 0.01$), indicating that stronger business disclosure practices enhance the positive effect of climate laws on financial stability. Transparency reduces information asymmetry and allows investors and regulators to assess climate-related risks more effectively, leading to a more stable financial system. Additionally, the standalone coefficient of CLIMLAW remains positive and significant (1.069, $p < 0.05$), confirming that climate laws independently contribute to financial stability, but their effect is amplified when coupled with greater corporate transparency. Policymakers should prioritize not only the implementation of climate laws but also the strengthening of corporate reporting standards to maximize their impact on financial resilience.

Third, regulatory bank supervision (SUPRV), sourced from the World Bank's Global Financial Inclusion and Consumer Protection

Table 11
Channels of influence.

	(1)	(2)	(3)
CLIMLAW	1.140***	1.069***	1.084***
	(0.351)	(0.394)	(0.394)
CLIMLAW * FINLITR	1.758**		
	(0.700)		
CLIMLAW * BDISCL		0.114**	
		(0.052)	
CLIMLAW * SUPRV			1.003**
			(0.416)
Controls	Yes	Yes	Yes
adj. R2	0.776	0.774	0.779
RMSE	1.564	1.680	1.562
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	644	606	510

Notes. The table reports the effects of channels through which climate laws could affect financial stability. The sample period is 2013–2020. We use an OLS model with fixed effects and country-clustered standard errors. Model (1) presents the mitigating effect of country-wide financial literacy with respect to risk understanding (FINLITR). Model (2) presents the mitigating effect of voluntary business disclosure in the country (BDISCL). Column (3) presents the mitigating effect of bank supervision practices (SUPRV).

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Survey, serves as a critical mitigation mechanism by measuring the frequency and intensity of on-site financial institution inspections. Strong regulatory oversight ensures that financial institutions integrate climate-related risks into their risk management frameworks, reinforcing the stabilizing effect of climate laws. Empirical research has shown that effective regulatory supervision reduces systemic banking risks and enhances financial stability (Demirgüç-Kunt and Detragiache, 2011). Enhanced supervision prevents excessive risk-taking by banks, strengthens compliance with environmental and financial regulations, and lowers the likelihood of climate-related financial disruptions. In Model 3, the interaction term CLIMLAW $\times$ SUPRV is positive and significant (1.003, $p < 0.05$), indicating that countries with stronger regulatory bank supervision experience greater financial stability under climate laws. Effective supervision ensures that banks incorporate climate-related risks into their risk management frameworks, reducing potential financial instability. Additionally, the standalone coefficient for CLIMLAW remains positive and highly significant (1.084, $p < 0.01$), confirming that climate laws independently enhance financial stability but are further reinforced by strong supervisory practices. Policymakers should consider strengthening bank supervision frameworks to maximize the effectiveness of climate-related financial regulations and improve financial system resilience.

Incorporating these mitigation variables enables the analysis to determine whether financial stability improvements driven by climate laws occur through enhanced financial literacy, stronger corporate disclosure, or stricter banking supervision. Validating these mechanisms provides actionable policy insights for reinforcing the financial system's resilience to climate-related risks. Recognizing these channels allows policymakers to design targeted interventions that amplify the positive effects of climate laws, ensuring that financial systems remain robust in the face of climate-related economic challenges.

8. Conclusions

This study examines the impact of climate laws on financial stability, addressing a pressing policy question amid growing financial risks linked to climate change. Using country-level data from 92 countries between 2012 and 2020, the analysis assesses whether climate regulations contribute to a more resilient banking sector. The results confirm that climate laws play a significant role in enhancing financial stability, demonstrating a consistent positive effect across different model specifications. These findings remain robust even when employing various econometric approaches designed to account for endogeneity concerns. Robustness checks, including tests for omitted variable bias and alternative estimation techniques, demonstrated that the findings are not driven by specific sample structures or financial stability measures and the estimated effects were not confounded by broader economic or governance factors. Climate laws rank among the top determinants of financial stability, particularly in developing economies where financial institutions are more vulnerable to climate-related risks.

Beyond establishing a direct relationship, this study explores mechanisms that explain how climate laws contribute to financial stability. The results indicate that countries with more developed financial knowledge, stronger corporate transparency practices, and more effective banking oversight experience a greater stabilizing effect from climate regulations. When individuals and institutions possess higher levels of financial awareness, they can better adapt to regulatory changes, reducing systemic risks. Similarly, greater transparency in financial reporting fosters trust among investors and enhances market confidence, thereby mitigating financial instability. Stronger regulatory oversight further ensures that financial institutions internalize climate-related risks, preventing excessive exposure and reinforcing overall system resilience.

While these findings provide evidence of the stabilizing role of climate laws, the study acknowledges certain limitations. First, while the instrumental variable approach strengthens causal inference, the identification strategy relies on the assumption that climate-related disasters influence financial stability only through their effect on climate laws, which, though reasonable, cannot be directly assessed. Despite strengthened identification, residual concerns may remain if policy adoption coincides with unobserved reforms that differentially trend post-adoption and are imperfectly captured by country trends. Second, the period of analysis is constrained, and future research could benefit from examining longer-term trends in financial stability following regulatory interventions. Third, while the study accounts for multiple economic and institutional factors, other potential channels, such as investor sentiment, political economy factors, or international climate finance policies, may also contribute to financial stability outcomes.

Future research should explore alternative sources of exogenous variation in climate laws, extend the time horizon of analysis, and assess how different institutional and governance settings influence the effectiveness of climate regulations. Additionally, further studies could investigate how climate policies impact cross-border financial stability and systemic risk transmission across interconnected financial markets. Applying advanced modeling techniques, such as machine learning or structural approaches, may also help uncover nonlinear interactions between climate regulation and financial stability.

CRediT authorship contribution statement

Hanan Alkatheeri: Writing – original draft, Formal analysis, Conceptualization. **Charilaos Mertzanis:** Writing – review & editing, Supervision, Project administration. **Ilias Kampouris:** Software, Investigation, Data curation.

Declaration of Competing Interest

The authors declare no known conflicts of interest in writing the paper.

Appendix. . Variable definitions

Variable	Definition	Source
FINSTAB	The Banking Sector's Z-Score is computed by adding the return on assets (ROA) to the capital-to-asset ratio and dividing the result by the standard deviation of ROA. This metric represents the number of standard deviations by which a bank's return on assets would need to fall before it reaches insolvency. A higher Z-score signifies greater financial stability, indicating a lower likelihood of insolvency.	The World Bank's Global Financial Development Database
CLIMLAW	The Number of Climate Laws and Regulations in a country is categorized into three levels: 0 (no laws), 1 (between 1 and 3 laws), and 2 (more than 3 laws and regulations).	Climate Change Laws of the World database
FMDPT	The Financial Market Depth Index is a normalized measure ranging from 0 to 1, where higher values indicate greater financial market depth.	IMF Financial Development database
INFL	The Consumer Price Index (Annual %) measures the annual percentage change in the cost of a fixed basket of goods and services, using 2010 as the base year (2010 = 100). It reflects the rate of inflation in consumer prices over time	World Development Indications
REGCAP	The Banks' Regulatory Capital Ratio (%) measures the proportion of a bank's capital to its risk-weighted assets, with higher values indicating stronger and more resilient banks.	World Economic Forum, GC Report.
BROA	The Bank's Return on Assets (ROA, % after tax) measures a bank's profitability relative to its total assets, with higher values indicating stronger financial performance.	World Development Indications
CONFINT	The Conflict-of-Interest Regulation Index (1−10) measures the strictness of regulations addressing conflicts of interest, with higher values indicating more stringent regulatory frameworks.	World Economic Forum, GC Report.
CONCOR	The Control of Corruption Index (1−7) assesses the effectiveness of measures to prevent corruption, with higher values indicating stricter control and stronger governance.	Worldwide Governance Indicators
POLSTB	The Policy Stability Index (1−7) measures the extent to which the government ensures stable policies, with higher values indicating greater policy consistency and predictability.	World Economic Forum, GC Report.
DISASTER	The Number of Climate-Related Disasters from Landslides represents the frequency of landslide events attributed to climate factors. This variable is used as an instrument in instrumental variable (IV) analysis to capture exogenous variation in climate laws.	EM-DAT International Disaster Database
NPL	The value of banks' non-performing loans (percent of total gross loans) in a country's banking sector	World Development Indicators
CLIMPOL	The Climate-Related Financial Policy Index measures the extent of a country's engagement in climate-related financial planning and policy implementation. It reflects the degree to which financial policies integrate climate considerations	D'Orazio and Thole (2022)
MCRQUAL	The Quality of Macroeconomic Environment Index (1−7) evaluates the overall stability and soundness of a country's macroeconomic conditions, with higher values indicating a more favorable macroeconomic environment.	World Economic Forum's Global Competitiveness Report,
FINAFF	The Affordability of Financial Services Index (1−7) assesses the accessibility and cost of financial services, with higher values indicating greater affordability	World Economic Forum, GC Report.
DIGADPT	The Digital Adoption Index for Business (0−1) measures the extent of digital technology adoption by businesses, with higher values indicating greater integration of digital tools and technologies in business operations.	World Bank
LGADAPT	The Legal Framework Adaptability for Digital Business Models Index (1−7) assesses how well a country's legal framework supports and adapts to digital business models, with higher values indicating greater flexibility and responsiveness	World Economic Forum, GC Report.
FRACETH	The Ethnic Fractionalization Index measures the probability that two randomly selected individuals from a given country belong to different ethnic groups. Higher values indicate greater ethnic diversity and societal fragmentation	Alesina et al. (2003)
FRACRLG	The Religious Fractionalization Index quantifies the probability that two randomly selected individuals in a country adhere to different religious groups. Higher values indicate greater religious diversity and fragmentation.	Alesina et al. (2003)
FINLITR	The Financial Literacy Index on Risk Diversification measures the proportion of individuals who correctly answer at least 3 out of 4 questions related to risk diversification. Higher values indicate a greater understanding of financial risk management principles	S&P Global Financial Literacy Survey
BDISCL	The Business Extent of Disclosure Index evaluates the transparency of corporate disclosures, particularly regarding financial and ownership information. Higher values indicate stronger disclosure requirements and greater transparency	World bank's Doing Business report
SUPRV	The Extent of On-Site Inspection of Financial Institutions Index (0−1) measures the degree to which financial institutions are subject to on-site regulatory inspections, with higher values indicating more comprehensive supervision and oversight	World Bank's Global Financial Inclusion and Consumer Protection Survey

Data availability

Data will be made available on request.

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