Centre for Economic Transition Expertise
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THE CETEX DISCUSSION PAPER SERIES: LAND AND OCEAN

Force of nature: diverging environmental law enforcement and financial stability in Brazil and Chile

Cristina Ortega and Matias Ossandon Busch

Summary

The credibility of environmental law enforcement shapes bank lending in emerging markets. This is particularly apparent in Latin America, where there are persistent gaps in legal implementation. In Chile, the staggered introduction of environmental courts led banks to reduce credit to environmentally risky firms. In Brazil, a sharp decline in enforcement capacity spurred lending to sectors linked to deforestation.

Credible enforcement can align banking activity with climate goals and ensure that financial institutions become effective partners in the green transition. This requires not only strong institutions but also coordinated information flows and shared analytical frameworks. By including factors such as enforcement predictability in scenario analysis, central banks and financial regulators can improve the accuracy of stress tests and help capture channels of contagion between environmental and financial systems.

Weaker enforcement can increase the flow of credit to companies with higher risk appetites, raising banks' exposure to transition or reputational shocks once the government restores environmental standards. Stronger enforcement can prompt an orderly reallocation of credit but may also constrain the financing of smaller or more credit-dependent firms. It is essential to understand these trade-offs when designing climate-related financial policies that support both environmental integrity and macro-financial stability.

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The CETEx Discussion Paper Series: Land and Ocean is designed to provide a broader and deeper understanding of environmental risks by introducing economic and financial policymakers to ecosystem degradation issues such as deforestation, pollution and biodiversity loss on land and in the oceans. The series aims to support financial and economic policymakers as they contend with and make considerations for these environmental degradation issues, in addition to climate change. The papers have been written and peer-reviewed by leading experts from academia, think tanks and central banks and are based on cutting-edge research.

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1. Introduction

Emerging markets face persistent challenges in aligning financial flows with environmental objectives. Although environmental regulations are becoming more widespread, they are often undermined by inconsistent law enforcement. As a result, there is a considerable gap between the formal provisions of environmental legislation and their application in practice. This disconnect is particularly apparent in Latin American countries, where the rule of law is often weak (OECD, 2018).

Efforts to bridge the enforcement gap are critical not only to achieving environmental goals but also to shaping financial risk and incentives – and, accordingly, to maintaining macro-financial stability. When enforcement is credible, environmentally harmful activities face higher expected compliance and liability costs, which are reflected in firms' risk profiles and, in turn, banks' lending decisions. Conversely, abrupt rollbacks in enforcement reduce the likelihood that breaches of environmental law will be detected and punished, effectively lowering the cost of engaging in environmentally damaging activities. This can function as an implicit subsidy, making such activities more attractive to both firms and lenders, and encouraging a reallocation of credit to sectors that may carry elevated transition, legal or reputational risks in the long term.

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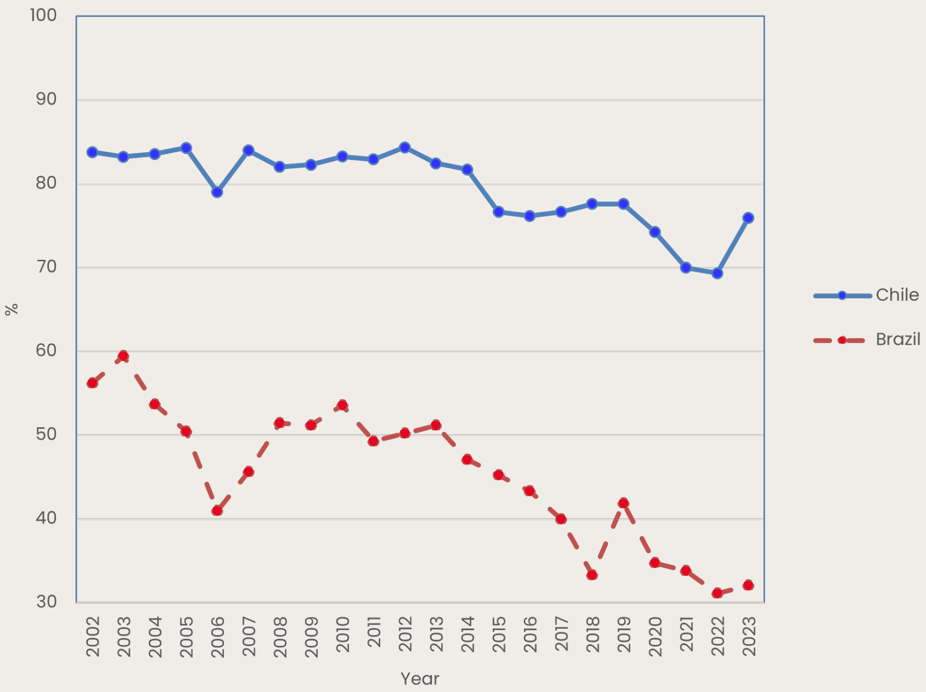
Global initiatives such as the Paris Agreement, the Kunming–Montreal Global Biodiversity Framework and the Network for Greening the Financial System (NGFS) call for the alignment of capital flows with sustainability objectives (e.g. BCBS, 2023; NGFS, 2023). Emerging markets face a dual challenge in this context: developing credible environmental institutions while ensuring that their financial systems can internalise environmental risks. Weak enforcement can hinder this alignment by distorting incentives – allowing environmentally harmful activities to remain profitable and discouraging financial institutions from adjusting to environmental considerations.

The impact of credible environmental law enforcement on bank lending is especially clear in the contrasting cases of Brazil and Chile, as this paper examines. Brazil experienced a sharp weakening of enforcement capacity in 2019 following substantial staff and resource cuts at the federal environmental agency. This was associated with an expansion of bank credit to agribusinesses operating in deforestation-sensitive areas. In contrast, Chile's staggered rollout of environmental courts between 2013 and 2017 strengthened enforcement credibility, leading banks to tighten credit to firms that have a significant negative environmental impact. Taken together, these quasi-natural experiments[1] indicate that financial institutions react systemically to shifts in enforcement credibility, even in the absence of new laws or explicit mandates on green finance.

Figure 1 compares the evolution of government effectiveness in Chile and Brazil between 2002 and 2023. Produced using the World Bank's Worldwide Governance Indicators, the index reflects public perceptions of the quality of public services, bureaucratic autonomy and the credibility of government commitments. These trends have important policy implications. They suggest that the credibility of environmental law enforcement is linked to financial stability. An increase in enforcement capacity not only promotes compliance with environmental norms but also shapes credit allocation, risk pricing and the overall alignment of financial flows with sustainability objectives.

[1] A quasi-natural experiment is a situation in which an external event or policy change affects some individuals or groups but not others in a way that allows researchers to study causal effects even without random assignment.

Figure 1. Government effectiveness



Source: Authors' elaboration based on data from the World Bank's Worldwide Governance Indicators.

“Brazil provides a striking example of how a reduction in environmental law enforcement can reshape financial incentives.”

A comparison of two Latin American economies with opposing policy enforcement trajectories provides lessons in how credible enforcement can act as both a legal mechanism and an economic signal that shapes banks' risk assessments and the direction of credit flows. This has far-reaching implications for green transition strategies in emerging markets.

2. Differing approaches to enforcement: environmental governance and bank lending

This section examines the contrasting case studies of Brazil and Chile to identify enforcement shocks, drawing on granular credit data to track how banks adjust their portfolios. The analysis offers insights into the effects of enforcement credibility on bank credit supply, controlling for broader economic and regulatory changes.

Brazil provides a striking example of how a reduction in environmental law enforcement can reshape financial incentives. The 2019 cuts in staffing and resources at the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) – the main agency responsible for conducting environmental inspections and imposing penalties for breaches of laws and regulations – weakened oversight and signalled weaker regulatory scrutiny of activities linked to deforestation. Banks responded rapidly by providing the largest increases in credit to agribusinesses in municipalities with high forest coverage and greater potential for land conversion. This was particularly true of banks that had higher risk appetites and operated in regions with stronger political ties to the presidential administration.

Although Brazil's central bank had already incorporated environmental compliance into rural credit regulation, the effectiveness of these rules relied heavily on environmental law enforcement. The marginalisation of IBAMA reduced the perceived probability that breaches of the law would be detected and punished, effectively lowering the cost of non-compliance for both borrowers and lenders.

In line with this, developments in Chile illustrate the consequences of a positive enforcement shock. There, the gradual establishment of environmental courts between 2013 and 2017 enhanced the credibility of environmental law enforcement. Banks operating in regions covered by the new courts curtailed lending to firms engaged in environmentally damaging activities, especially those facing tighter financial constraints or operating in pollution-intensive sectors.

This trend was most pronounced for smaller banks and more environmentally exposed loan portfolios, suggesting that credible enforcement can trigger a selective reallocation of credit towards greener activities. Chile's institutional reforms show how strengthened law enforcement capacity can promote financial behaviour that supports environmental objectives without imposing new financial regulations.

Taken together, the experiences of Brazil and Chile demonstrate that the credibility of environmental law enforcement is a critical yet often overlooked factor in sustainable finance. Shifts in enforcement capacity can alter the incentives that shape credit allocation and risk assessment in the banking sector. Therefore, it is essential to understand this dynamic when designing policies to translate environmental commitments into significant changes in financial behaviour.

> "Developments in Chile illustrate the consequences of a positive enforcement shock."

The importance of legal environments to financial development is well established: countries with stronger investor protection and more predictable enforcement have deeper credit markets and more efficient financial intermediation (Levine, 1998; Beck et al., 2003). However, much less is known about how differences in enforcement capacity affect the allocation of credit in practice. In jurisdictions where the rule of law is weak, banks have few incentives to internalise environmental externalities or comply with non-financial regulations, while borrowers generally believe they are unlikely to face penalties for misbehaviour. This institutional gap is particularly relevant in environmental law, whose deterrent effect depends not just on the existence of rules but on their credibility and continuity.

Recent studies show that regulatory enforcement shapes how firms and financial institutions respond to environmental risk. For instance, empirical work in China and other emerging markets finds that when inspection and sanctioning capacity intensifies, banks restrict credit to polluting industries and reprice environmental risk (Wu et al., 2023). For borrowers, the decision to invest in mitigation depends not only on abatement costs but also on the credibility of environmental liability regimes (Xu and Kim, 2022). These studies suggest that enforcement capacity acts as a vital link between environmental governance and financing decisions.

There is growing evidence of how banks incorporate environmental risks into lending conditions. Credit supply tightens and loan spreads rise following shocks that increase expected transition risks (IMF, 2021; ECB, 2022; Ivanov et al., 2023). At the same time, inconsistencies between banks' disclosures and their actual lending highlight persistent 'greenwashing' problems (Degryse et al., 2023; Giannetti et al., 2023; BIS, 2023). As market transparency improves, the total amount of credit available to high-polluting firms declines (Wellalage and Kumar, 2021).

While this indicates that credible regulatory pressure can discipline financial flows, there has been limited causal evidence of how changes in enforcement affect bank behaviour in emerging markets.

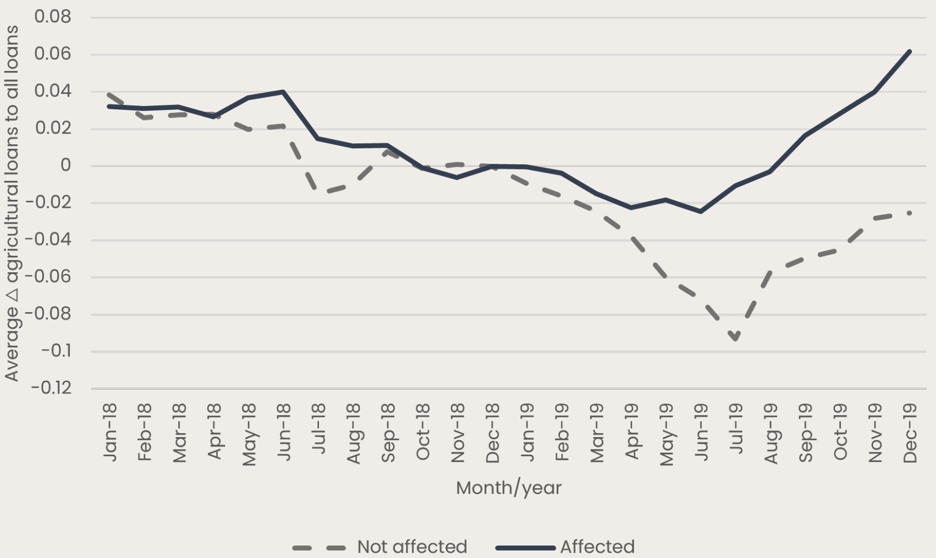
The experiences of Brazil and Chile help close that gap in knowledge, revealing that banks respond not only to environmental regulation itself but also to its enforceability. This consideration is vital to the global agenda on sustainable finance: credible enforcement is a prerequisite of effective financial policies focused on climate and environmental issues.

2.1. Brazil's weakening environmental oversight

Brazil provides an ideal context in which to test how a sudden loss of enforcement capacity affects financial behaviour. The country combines a bank-based financial system with sectors that are directly linked to deforestation risk – most notably, agribusiness. As tropical deforestation in Amazonia accounts for an estimated one-fifth to one-quarter of the global greenhouse effect, there is an urgent need for research to understand and address these environmental issues (Pearce and Brown, 2023). In Brazil, efforts to combat deforestation have primarily focused on monitoring and fines to deter illegal clearing (Fearnside, 2005).[2] In early 2019, the new presidential administration led by Jair Bolsonaro sharply reduced staff and resources at IBAMA. The change was abrupt and exogenous to local credit conditions, allowing it to serve as a quasi-experimental enforcement shock.[3]

Banks' responses can be seen in supervisory data from all municipality-level bank branches active across Brazil in 2018–2020. Figure 2 compares the change in branches' share of agribusiness lending before and after the shock across municipalities with differing levels of exposure to deforestation. Exposure is calculated using the correlation between the reduction in IBAMA oversight personnel at the state level and the share of natural forest area within each municipality. This includes bank- and state-fixed effects to control for unobserved supply and demand factors.

Figure 2. Agribusiness credit growth in Brazilian regions affected and unaffected by the reduction in staff and resources at IBAMA



Note: The figure shows the average change in the share of agribusiness loan growth for branches located in regions that experienced large and small decreases in IBAMA staff between 2018 and 2020.
Source: Authors, adapted from Berger et al. (2025).

"Credible enforcement is a prerequisite of effective financial policies focused on climate and environmental issues."

[2] The Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm), launched in 2004, promoted conservation reforms in Brazil. The plan, combined with economic factors, resulted in a substantial decline in deforestation rates from 2004 to 2012 (West and Fearnside, 2021). However, the rate of deforestation has risen since 2012, highlighting the need for continued efforts to address this issue.

[3] See Berger et al. (2024).

A comparison of changes in bank branches' lending to agribusiness before and after the enforcement cuts – across areas with differing opportunities and incentives to deforest – reveals the association between weaker enforcement and credit allocation while adjusting for broader trends in loan demand and regional economic performance. The data in Figure 2 aboveshow that branches in the regions most affected by the reduction in IBAMA's enforcement staff experienced a marked increase in agribusiness lending from 2019, even as lending in less-affected regions remained broadly stable.

This divergence began immediately after the enforcement cuts, indicating that the observed credit expansion was triggered by the relaxation of environmental oversight rather than by regional credit demand or macroeconomic factors. These effects are economically and statistically significant: in municipalities with high potential for deforestation (those in which around 70% of land is made up of available forest area), a 5-percentage-point decrease in IBAMA's oversight personnel is associated with a 35-basis-point increase in bank branches' allocation of credit to agribusiness.

"In Brazil, credit expansion was triggered by the relaxation of environmental oversight rather than by regional credit demand or macroeconomic factors."

A comparison between branches of the same bank in regions with differing exposure to the enforcement shock helps eliminate the influence of factors such as differences in risk management, funding structures and business strategies between banks. Controlling for regional credit demand and branch-level characteristics such as size, profitability and liquidity ensures that the results reflect changes in lending behaviour rather than local fluctuations in demand.

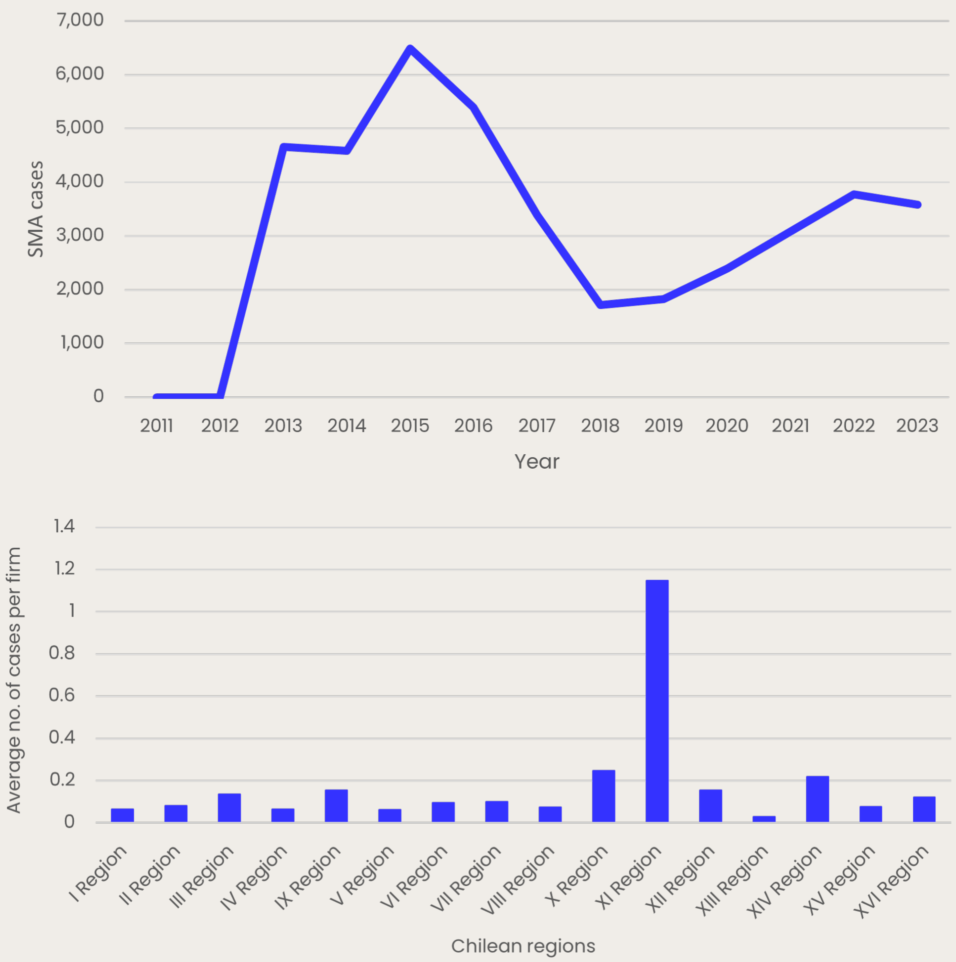
Bank branches located in more forested regions – where reduced monitoring made deforestation more profitable – expanded their share of agribusiness credit from 2019. The effect was strongest among banks that had a higher risk appetite and were located in areas politically aligned with the Bolsonaro administration, suggesting that both market incentives and political connections reinforced the response. Moreover, increases in bank credit were followed by noticeable rises in local deforestation, indicating that these shifts in financial flows caused real environmental damage.

2.2. Chile's strengthening enforcement

Chile provides the mirror image of Brazil's experience – a gradual strengthening of environmental law enforcement that can be traced to institutional reform rather than regulatory change. Between 2013 and 2017, Chile established a network of environmental courts with regional jurisdiction, complementing the Superintendencia del Medio Ambiente [Superintendency of the Environment] (SMA), which imposes administrative penalties for breaches of environmental laws and regulations. These courts ensure that the SMA's decisions are legally binding and enforceable, thereby increasing the credibility of environmental law.

The courts' staggered rollout across regions over several years led to a series of improvements in local enforcement that were independent of financial conditions (Ossandon Busch et al., forthcoming). Chile's three environmental courts were introduced sequentially under Law No. 20,600. The Santiago court began operating in December 2012, with jurisdiction over the central regions (Valparaíso, Metropolitana, O'Higgins, Maule and Ñuble). The Valdivia court followed in December 2013, covering the southern regions (Biobío, La Araucanía, Los Ríos, Los Lagos, Aysén and Magallanes). The Antofagasta court was the last to become operational, in June 2017, overseeing the northern regions (Arica y Parinacota, Tarapacá, Antofagasta, Atacama and Coquimbo). This staggered introduction created distinct regional and temporal variations that were helpful in identifying the effects of environmental law enforcement.

Figure 3. Evolution of SMA cases and average case concentration across regions



Source: Adapted from Ossandon Busch et al. (forthcoming).

The top panel in Figure 3 shows the annual number of environmental law enforcement cases initiated by the SMA between 2011 and 2024. The bottom panel displays the average number of cases firms are involved in by region in the same period, capturing regional variations in enforcement intensity. (The average is calculated by dividing the number of SMA cases in a region by the number of firms registered there.)

As the figure shows, SMA enforcement activity varied substantially over time and across regions. The number of annual cases rose sharply following the establishment of the environmental courts in 2013, and remains unevenly distributed across the country. Southern regions, particularly XI Region (Aysén), exhibit the highest enforcement intensity. These variations provide a basis for identifying how differences in regulatory pressure and legal enforceability affect banks' approach to lending.

By drawing on Chile's complete credit-registry data – covering all lending relationships between banks and firms – and the administrative

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records of environmental penalties issued by the SMA, it is possible to compare changes in lending behaviour between regions that gained an environmental court and regions that did not. Because the rollout of the courts followed a predetermined legal schedule rather than local economic developments, this approach captures the effect of stronger enforcement credibility on bank lending.

A categorisation of firms according to their potential environmental impact, using standardised sector-level measures from the ENCORE database, helps reveal the distributional effects of enforcement and differences in the pressure that various economic activities exert on natural capital through deforestation, water use and emissions.[4] Further insights can be gained from testing whether banks reduce credit more sharply to high-impact firms once enforcement becomes legally binding, and from accounting for other sources of variation by comparing the same relationships between banks and firms over time, while controlling for sectoral shocks, national credit cycles and the specific characteristics of individual banks.

The evidence points to a simple but powerful finding: environmental rules only matter to financial institutions when they are actually enforced. Stronger enforcement was already linked to lower lending to environmentally exposed firms, but the effect became far more apparent once environmental courts were in place. In regions with such courts, increases in enforcement have led to a marked contraction in new credit, especially for firms operating in environmentally sensitive sectors. Crucially, this shift has occurred only after courts have become operational and has persisted over time, suggesting that banks react to the credibility of enforcement – not to regulations on paper. Environmental courts turn regulation into a financial risk that lenders can no longer ignore.

“Environmental rules only matter to financial institutions when they are actually enforced.”

The adjustment in credit is far from uniform. It falls most heavily on smaller and more financially constrained firms, and on banks with greater exposure to polluting activities. In practice, credible enforcement tightens financing conditions precisely where firms have the least room to absorb shocks or find alternative funding. For policymakers, this highlights a key trade-off: stronger enforcement can help redirect capital away from environmentally risky activities, but it can also intensify financing friction during the green transition. Therefore, effective green policies should be designed to anticipate how legal institutions will shape bank behaviour – and to prevent enforcement from inadvertently choking off credit to firms that are central to an orderly transition.

3. Conclusion and policy recommendations

The contrasting experiences of Brazil and Chile show that enforcement credibility is a critical transmission channel between environmental governance and financial behaviour. When the perceived likelihood of penalties declines, as in Brazil, banks treat activities with a high environmental impact as less risky, reallocating capital towards sectors that provide short-term profits from practices such as deforestation. Conversely, when enforcement becomes more credible, as in Chile, banks reassess their exposure and scale back lending to firms with higher environmental risks. Importantly, in Brazil and Chile, these adjustments occurred even without explicit green finance mandates or regulatory directives.

[4] ENCORE (Exploring Natural Capital Opportunities, Risks and Exposure) maps economic activities to their dependencies and their impact on natural capital. See: https://encore.naturalcapital.finance

In terms of financial stability, this implies that environmental law enforcement improves not only sustainability outcomes but also the resilience of the banking system. Weaker enforcement can increase the flow of credit to companies with higher risk appetites, increasing banks' exposure to transition or reputational shocks once the government restores environmental standards. Stronger enforcement, by contrast, can prompt an orderly reallocation of credit but may also constrain the financing of smaller or more credit-dependent firms, generating adjustment costs that require policymakers' attention. It is essential to understand these trade-offs when designing climate-related financial policies that support both environmental integrity and macro-financial stability.

Regulators and policymakers should treat the credibility of environmental law enforcement as a financial variable. Efforts to strengthen inspection capacity, legal certainty and judicial follow-through can reduce uncertainty about future liabilities and help banks internalise transition risks. Conversely, abrupt rollbacks in enforcement can create implicit subsidies for environmentally harmful activities, undermining both climate and environmental policy and the prudential regulation of the financial system. Accordingly, it is important to:

- **Integrate enforcement credibility into financial supervision**. Supervisory authorities should monitor indicators of enforcement strength – such as inspection coverage, judicial resolution times and the implementation of penalties – as part of climate and environmental risk assessments.
- **Strengthen coordination between environmental and financial regulators**. Regular data sharing between environmental agencies and prudential supervisors can help identify regions, sectors or institutions with rising exposure to environmental liabilities.
- **Embed enforcement scenarios in climate stress testing**. Financial authorities should consider institutional credibility as a variable in the design of stress tests, exploring how stronger or weaker enforcement could alter transition pathways, sectoral exposure and collateral valuation.

Credible enforcement of environmental law can enhance the transmission of climate and environmental policies. Therefore, by including institutional factors such as enforcement predictability in scenario analysis, central banks and financial regulators can improve the accuracy of stress tests and help identify channels of contagion between environmental and financial systems.

The developments in Brazil and Chile described in this paper underscore the need for closer cooperation between environmental regulators, financial supervisors and central banks. Credible enforcement requires not only strong institutions but also coordinated information flows and shared analytical frameworks. International collaboration through networks such as the NGFS, the Basel Committee on Banking Supervision and regional central-bank forums can accelerate this integration by developing common metrics and methodologies to measure enforcement credibility in financial-stability assessments. Governments should embed this form of cooperation in their sustainable-finance agendas to ensure that enforcement, supervision and credit allocation move in sync towards an orderly and credible green transition.

"Environmental law enforcement improves not only sustainability outcomes but also the resilience of the banking system."

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About the authors

Cristina Ortega is Assistant Professor of Finance at the Universidad Autónoma de Madrid.

Matias Ossandon Busch is Senior Economist at the Banco de España and the Halle Institute for Economic Research (IWH).

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