

The Impact of Green Credit on Bank Asset Quality: Does Green Lending Reduce Non-Performing Loan Ratios?

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Abstract: Green credit has emerged as a key policy instrument aligning banking capital allocation with environmental transition. This paper examines whether green lending improves bank asset quality by reducing non-performing loan (NPL) ratios, analyzing the theoretical channels, empirical evidence, and institutional conditions underlying this relationship. Four mechanisms are identified: enhanced environmental risk screening during credit appraisal, portfolio reallocation away from pollution-intensive sectors, selection of higher-quality borrowers meeting stricter disclosure standards, and improved internal risk governance catalyzed by green lending implementation. The analysis of existing empirical studies reveals that green credit generally contributes to lower NPL ratios, but the effect is conditional rather than automatic. Green lending improves asset quality most effectively when it operates as genuine risk governance, with banks embedding long-term transition risk into loan assessment. However, where green classification is vague, political pressure outweighs commercial discipline, or banks lack project-monitoring capacity, green credit may rename risk rather than reduce it. The paper concludes that green credit tends to lower NPL ratios only when environmental criteria are translated into substantive credit discipline, supported by clear taxonomy, robust disclosure, and strong bank-level monitoring capacity.

Keywords: Green Credit; Bank Asset Quality; Non-Performing Loans; Green Lending; Credit Risk; Sustainable Finance

1. Introduction

Bank asset quality is often treated as a technical matter of loan performance, but it is better understood as a judgment about whether a banking system has correctly imagined the future. A loan becomes non-performing when

the assumptions embedded in its original pricing, monitoring, or collateral evaluation fail to survive economic reality. In that sense, non-performing loans are not merely signs of borrower distress; they are retrospective corrections to prior errors in risk recognition. This logic makes green credit an especially important topic. If environmental transition, carbon regulation, pollution liability, and climate-related adjustment costs increasingly shape firm profitability, then a bank that ignores these factors is not behaving neutrally. It is mismeasuring risk.

The modern development of green credit reflects this shift. China's 2012 Green Credit Guidelines formalized the expectation that banks should incorporate environmental and social risks into lending decisions, and subsequent policy development turned green credit into a major component of the banking system rather than a marginal experiment. Empirical work built around this policy environment has since found that banks' green lending shares are associated with changes in credit risk and solvency outcomes, though the magnitude depends on bank ownership and scale. The significance of these findings lies not only in the Chinese case itself, but in what it reveals conceptually: environmental exposure has become financially material enough to alter bank asset quality.

That does not mean green credit should be romanticized. The proposition that green lending reduces non-performing loan ratios may sound plausible, yet several distinct mechanisms could produce that result. Green loans may perform better because environmentally responsible borrowers are genuinely less risky; because banks that implement green credit are better managed in general; because green sectors receive policy protection; or because green classification screens out legacy industries that were already becoming fragile. These explanations are not equivalent. Some imply that green credit enhances the substance of credit allocation; others suggest that it benefits from

selection effects or supportive regulation that may not endure.

The analytical challenge, then, is to distinguish between a symbolic and a structural account of green finance. The symbolic account treats green credit as a moral or reputational innovation that may improve the public image of banks but says little about loan quality. The structural account sees green credit as a mechanism through which banks reprice environmental externalities, transition risk, and sectoral decline, thereby improving the resilience of loan portfolios. The structural interpretation is more persuasive, but only under certain institutional conditions.

This paper argues that green credit generally improves bank asset quality and lowers non-performing loan ratios, not because “green” assets are inherently safe, but because environmental criteria can correct long-standing blind spots in credit risk assessment. Once environmental liabilities, transition costs, and regulatory vulnerability are incorporated into credit appraisal, banks can reduce exposure to borrowers whose business models are likely to deteriorate. However, the beneficial effect is conditional on regulatory credibility, taxonomy quality, information disclosure, and bank-specific monitoring capacity. Green credit strengthens asset quality when it deepens risk discipline; it may weaken asset quality when it becomes target-driven or politically performative. Table 1 summarizes the main channels through which green credit may affect bank asset quality.

Table 1. Main Channels through Which Green Credit May Affect Bank Asset Quality

Channel	How the channel may reduce NPLs	Main limitation
Portfolio reallocation	Lending shifts away from highly polluting, regulation-sensitive sectors with greater long-run default risk	Concentration in selected green sectors may create new risks
Environmental due diligence	Banks collect additional information on compliance, transition risk, and operational sustainability	Better outcomes may reflect better banks rather than green lending itself
Borrower governance and disclosure	Green-oriented firms may have stronger transparency, management quality, and stakeholder discipline	Disclosure standards vary and may be manipulated
Policy support and market confidence	Green projects may receive regulatory encouragement, funding support, and lower refinancing pressure	Apparent safety may depend on continued policy backing
Dynamic transition-risk pricing	Banks price carbon and regulatory exposure earlier, reducing future deterioration in loan quality	Long-horizon projects may delay the emergence of losses

2. Literature review

2.1 Asset Quality and the Logic of Non-Performing Loans

The literature on bank asset quality consistently treats non-performing loans as one of the clearest indicators of balance-sheet weakness. Early work showed that non-performing asset information was useful in evaluating bank asset quality because it provided evidence beyond broad profitability measures [1]. Later studies linked bad loans to management quality and cost inefficiency, suggesting that deteriorating asset quality often reflects internal governance failures as much as external shocks [2]. Macroeconomic studies further demonstrated that GDP growth, unemployment, inflation, and interest-rate conditions interact with bank-specific variables to shape NPL dynamics [3]. More recent reviews confirm that NPLs are multi-causal outcomes produced by the interaction of borrower fragility, bank behavior, regulatory structure, and economic cycles [4].

This literature matters for green credit because it warns against simplistic causality. If a bank’s NPL ratio declines after expanding green lending, the result cannot automatically be attributed to the “greenness” of the portfolio. It may instead reflect stronger governance, better risk controls, favorable macroeconomic conditions, or changes in supervisory treatment. Therefore, any claim that green credit improves asset quality must demonstrate that environmental risk screening provides additional explanatory power beyond conventional determinants of bank loan performance.

2.2 Green Credit as a Form of Financial Discipline

The literature on environmental finance increasingly rejects the older assumption that environmental issues are external to banking. Thompson and Cowton [5] argued that environmental exposure affects the quality of lending decisions and should therefore be integrated into ordinary banking practice rather than treated as a public-relations add-on. In Chinese banking, Weber [6] showed that sustainability-oriented practices could be linked to financial outcomes, reinforcing the view that environmental considerations can enter mainstream credit evaluation. Later work on green banking and sustainable finance developed

this further, treating environmental criteria as relevant to profitability, risk control, and institutional resilience rather than merely to corporate social responsibility [7,8].

The strongest theoretical move in this literature is the redefinition of creditworthiness. Firms in pollution-intensive sectors may appear solvent under conventional accounting metrics while remaining vulnerable to regulatory costs, carbon constraints, technology displacement, or reputational deterioration. Once these elements are recognized, green lending becomes less a normative preference than a revised method of risk selection. This is why the literature increasingly frames green credit as part of prudent banking rather than as a concession to environmental politics.

2.3 Empirical Findings on Green Credit and Bank Risk

Empirical research has produced a largely supportive but qualified picture. Cui et al. [9] found that a higher green credit ratio was associated with a lower non-performing loan ratio among Chinese banks, implying that green lending could improve both environmental and financial performance. Guan et al. [10] reinforced this logic from the opposite direction by showing that higher carbon intensity of loans was associated with higher NPL ratios. More recent work by Zhou et al. [11] demonstrated that the relationship between green lending and bank credit risk is conditional on bank size and ownership structure rather than uniformly positive. The implication is important: green lending improves solvency not simply because it is green, but because its impact is mediated by institutional context.

Other studies complicate the picture further. Gao et al. [12] used a quasi-natural experiment to examine the impact of green credit policy on commercial bank financial performance and found measurable policy effects, but not all of these effects can be reduced to asset quality alone. Feng et al. [13] found that green credit reduced bank risk-taking in the short run, yet the longer-run relationship was more unstable, suggesting that the quality of project selection and monitoring matters over time. Huang et al. [14] argued that obstacles to effective green credit remain substantial, particularly in implementation and information processing. These studies jointly suggest that green credit can improve asset quality, but only when it is

supported by high-quality classification, regulatory credibility, and bank capability rather than by volume targets alone.

2.4 The Unresolved Problem in the Literature

The main weakness in the existing literature is that it often moves too quickly from positive association to policy celebration. A lower NPL ratio following green credit expansion may indicate better risk management, but it may also reflect state support, temporary sectoral preference, or the fact that stronger banks self-select into green lending. In other words, the literature has not always separated causal enhancement of asset quality from institutional sorting. This matters because policy recommendations differ depending on the mechanism. If green credit works mainly by forcing banks to improve underwriting, then reform should focus on monitoring, taxonomy, and disclosure. If it works mainly by channeling subsidized credit into favored sectors, then asset-quality gains may be less durable.

The analytical task is therefore not to ask whether green credit is good in the abstract, but whether it lowers non-performing loans by changing how banks recognize and price future vulnerability.

3. Theoretical Framework: why Green Credit may Reduce Non-Performing Loans

Green credit can influence asset quality through at least four interrelated mechanisms.

First, it changes the informational content of credit screening. Conventional credit assessment focuses on balance sheets, income statements, collateral values, and repayment history. These are indispensable variables, but they are incomplete where future environmental liabilities are substantial. A pollution-intensive borrower may have solid current cash flow while facing rising compliance costs, mandatory upgrades, permit constraints, or declining product demand under decarbonization pressure. If banks ignore such vulnerabilities, they underprice risk. Green credit potentially corrects this error by expanding the information set used in loan appraisal. It therefore lowers NPLs not by rewarding morality, but by pricing future deterioration earlier.

Second, green credit improves asset quality through portfolio reallocation. Banking systems with heavy exposure to energy-intensive or pollution-intensive industries face a structural

problem: some sectors that once appeared profitable may become increasingly fragile as environmental regulation tightens and transition costs rise. By redirecting credit toward sectors with stronger long-run viability, green lending can reduce exposure to stranded-asset risk. This mechanism is especially persuasive in economies where banks historically financed industrial expansion with insufficient regard for environmental efficiency. Green credit then operates as a selective withdrawal from sectors whose apparent stability was partly an artifact of outdated regulation.

Third, green credit may be associated with better borrower quality. Firms that qualify for green lending are often required to meet stricter disclosure standards, demonstrate cleaner production methods, or participate in sectors with clearer future policy support. These firms may have stronger governance, better strategic planning, and greater operational transparency. If so, part of the observed reduction in NPLs may result from the quality of borrowers green lending attracts rather than from the label itself. That does not weaken the case for green credit, but it changes its meaning: the advantage lies not in environmental symbolism but in a closer alignment between sustainability and managerial competence.

Fourth, green credit may induce better bank behavior. A bank that develops systems to evaluate environmental risk, verify project use of funds, and monitor sustainability-related performance is often building broader institutional capacity. That same capacity can improve underwriting discipline more generally. In this sense, green credit can operate as a catalyst for more sophisticated risk governance inside banks. Asset quality improves not because green loans are magically safer, but because the process of implementing green lending forces banks to become more discriminating and less tolerant of low-quality exposure.

Yet each mechanism contains an internal tension. Informational improvement depends on reliable data. Portfolio reallocation can become policy herding. Better borrower selection may reflect pre-existing advantages rather than transformation. Organizational learning can be overwhelmed if green lending is pursued too rapidly. Therefore, the theoretical expectation is conditional: green credit should reduce NPLs where it deepens risk governance, but not where it merely rebrands bank portfolios.

4. Empirical discussion: Does Green Lending Actually Lower Bad-Loan Ratios?

The empirical literature broadly supports a negative relationship between green credit and NPL ratios, but the strength of that relationship depends on design and context.

Cui et al. [9] provide one of the clearest early results: among Chinese banks, a higher green credit ratio was associated with a lower NPL ratio. This finding is conceptually important because it directly links environmentally oriented lending to a classic indicator of asset quality. Guan et al. [10] reinforce the result by showing that carbon-intensive lending tends to be associated with poorer loan performance. Together, these studies suggest that environmental exposure is not incidental to bank asset quality; it is part of the risk architecture of the loan portfolio.

However, the more sophisticated evidence warns against treating the relationship as uniform. Zhou et al. [11] find that the association between green lending and lower credit risk depends critically on size and state ownership. This qualification matters because it reveals that green credit is mediated by institutional structure. Large banks, especially those with different ownership characteristics, may enjoy stronger screening capacity, better policy access, or superior information networks. Smaller banks may adopt green lending in a more constrained or less technically precise way. Thus, the effect of green credit on NPLs is not merely sectoral but organizational. Table 2 summarizes selected empirical findings on green credit and asset-quality-related outcomes.

Table 2. Selected Literature on Green Credit and Asset-Quality-Related Outcomes

Study	Context	Main finding
Cui et al. [9]	24 Chinese banks	Higher green credit ratio is associated with lower NPL ratio
Guan et al. [10]	China	Higher carbon intensity of loans is associated with higher NPL ratios
Zhou et al. [11]	41 Chinese banks, 2007–2018	Green lending reduces credit risk, but the effect depends on size and state ownership
Gao et al. [12]	Chinese commercial banks	Green credit policy affects bank financial performance through risk and profitability channels
Feng et al. [13]	Chinese commercial banks	Green credit reduces bank risk-taking in the short run, but the long-run effect is less stable
Huang et al. [14]	China	Obstacles in implementation weaken the effectiveness of green credit policy

The dynamic studies are especially revealing. Feng et al. [13] show that green credit can reduce risk-taking in the short term, but the beneficial effect may weaken over time. This is not a contradiction of the green-credit thesis; it is a refinement of it. Initially, banks may improve portfolio quality by shifting away from obviously risky brown sectors. Over time, however, if banks expand green credit too aggressively into immature technologies, politically favored projects, or long-payback investments, new default risks can accumulate. The implication is that green credit is most effective when it remains grounded in prudential discipline rather than becoming a growth target in its own right.

Another reason for caution lies in measurement. The category “green loan” is not uniform across jurisdictions or banks. Some loans finance clearly revenue-generating renewable infrastructure with stable policy backing; others support broader transition projects whose cash-flow profile is less predictable. If these projects are aggregated into one indicator, researchers may overstate the homogeneity of green credit and understate the possibility that some green segments are safer than others. Therefore, the empirical claim that green lending lowers NPLs should be interpreted as a portfolio tendency, not a guarantee about every green asset class.

This qualification does not destroy the positive conclusion. Rather, it explains why the most credible literature tends to present green credit as a conditional improvement in asset quality. Banks reduce bad-loan ratios when green lending is selective, information-rich, and strategically aligned with long-term sectoral viability. They do not reduce bad-loan ratios simply by increasing the nominal size of green portfolios.

5. Research Design for a Rigorous 4000-Word Empirical Paper

A serious empirical paper on this topic should treat the non-performing loan ratio as the primary dependent variable, because NPLs remain the most direct indicator of asset-quality deterioration in banking research. Nevertheless, alternative measures such as loan-loss provisions, impaired-loan coverage, or bank Z-scores should be used in robustness checks to avoid overreliance on one accounting metric.

The core explanatory variable should be a bank’s green credit ratio, measured as green loans divided by total loans. If possible, this should be further divided into categories such as renewable energy, energy efficiency, green transport, and pollution-control financing. A single aggregate green-loan variable obscures sectoral heterogeneity and can produce misleading conclusions if one segment dominates the risk profile.

The model should also include bank-specific controls: size, capital adequacy, return on assets, liquidity, cost efficiency, loan growth, and ownership structure. Macroeconomic controls should include GDP growth, inflation, policy interest rates, and possibly regional environmental-regulation intensity if a multi-region sample is used. Fixed-effects panel models are useful for controlling unobserved heterogeneity, but stronger identification can be achieved through difference-in-differences designs around policy shocks such as the 2012 Green Credit Guidelines. Studies using this policy architecture have already shown that China’s regulatory intervention materially altered bank behavior and credit-risk relationships [11]. Table 3 outlines the suggested empirical model structure.

Table 3. Suggested Empirical Model Structure

Component	Suggested operationalization
Dependent variable	NPL ratio; robustness: loan-loss provisions, impaired loan ratio, Z-score
Main explanatory variable	Green loans / total loans
Extended explanatory variables	Carbon-intensive lending share; sectoral composition of green loans
Bank controls	Size, CAR, ROA/ROE, liquidity, cost-to-income ratio, loan growth, ownership
Macro controls	GDP growth, inflation, interest rate, regional policy intensity
Identification strategies	Fixed effects; difference-in-differences; system GMM; IV for endogeneity
Mechanism tests	Sector reallocation, borrower governance, transition-risk exposure, policy support

Mechanism testing is particularly important. If green credit lowers NPLs by reducing exposure to polluted industries, then high-carbon loan share should mediate the effect. If it works

because green borrowers have better governance, then disclosure quality should strengthen the relationship. If it works because banks that implement green credit are better managed, the effect should be stronger in banks with better cost efficiency or risk-management structures. Without such tests, a paper may show correlation while failing to explain the causal pathway.

6. Why the Effect is Conditional Rather Than Automatic

The strongest mistake in the policy discourse is to assume that green lending is safer because it is ethically superior. Banking does not reward virtue in the abstract; it rewards correctly priced future repayment capacity. Green credit improves asset quality when environmental criteria help banks identify long-horizon vulnerabilities that conventional underwriting ignored. It fails when environmental labels become administratively imposed substitutes for real project evaluation.

This conditionality has at least three dimensions. The first is taxonomy quality. If green classifications are vague, inconsistent, or vulnerable to manipulation, banks may hold assets that count as green for reporting purposes but remain risky in economic substance. In such cases, apparent improvements in portfolio composition need not correspond to actual improvements in repayment quality.

The second is monitoring capacity. Green projects often require technical knowledge, especially where future cash flow depends on regulatory design, technology adoption, or environmental performance verification. Banks lacking these capabilities may extend green credit on the basis of labels, third-party assurances, or policy expectations rather than rigorous project analysis. This can delay rather than prevent bad-loan formation.

The third is political distortion. In strongly policy-driven systems, banks may expand green lending to satisfy regulatory targets or signal alignment with official priorities. If this weakens commercial discipline, the short-term portfolio may appear greener while the underlying risk becomes more opaque. Here the logic of green credit turns against itself: what was intended as prudential reallocation becomes quota-driven credit expansion. Table 4 summarizes the conditions under which green credit is most likely to improve bank asset quality.

Seen this way, the real achievement of green credit is not that it identifies a morally favored set of borrowers. Its achievement is that it redefines what counts as prudent lending in an economy where environmental transition has become financially material. The point is not to lend green because green is good; it is to avoid lending blindly to business models whose future viability has been overstated by outdated credit logic.

Table 4. Conditions under Which Green Credit Is Most Likely to Improve Bank Asset Quality

Condition	Expected effect on NPLs
Clear and enforceable green taxonomy	Stronger reduction in NPLs due to better classification quality
High borrower disclosure and transparency	Lower information asymmetry and better loan monitoring
Strong bank-level risk management capacity	Greater ability to translate environmental screening into prudent lending
Moderate and selective growth of green lending	Better portfolio quality than rapid target-driven expansion
High exposure to brown transition risk in legacy portfolio	Larger gains from reallocating away from vulnerable sectors
Weak standards or greenwashing	Little or no durable reduction in NPLs
Politically driven expansion with soft monitoring	Temporary appearance of lower risk, followed by potential later deterioration

7. Policy Implications

For policymakers, the main implication is that green credit should be regulated as a risk-governance framework rather than as a numerical lending campaign. Quantity-based targets alone are insufficient and may even be harmful if they encourage rapid expansion without robust verification. The real institutional priority lies in standard-setting, taxonomy clarity, borrower disclosure, data-sharing infrastructure, and supervisory methods that tie green lending to asset-quality performance rather than to headline growth.

For banks, the implication is equally demanding. Green credit should not be isolated in a small sustainability department while mainstream credit teams continue to assess borrowers using

conventional short-horizon models. Environmental exposure, transition risk, and compliance vulnerability need to be integrated into ordinary lending decisions across sectors. Otherwise, green lending remains a niche rather than transforming the bank's overall risk culture. For researchers, the most important implication is methodological. Future work should stop treating green credit as a binary virtue variable and instead analyze its composition, borrower type, maturity structure, regulatory support, and monitoring intensity. The real question is not whether green credit is beneficial in general, but which kinds of green credit improve asset quality most reliably and under what institutional conditions.

8. Conclusion

Green credit does tend to reduce bank non-performing loan ratios, but the proposition is true only when stated with proper discipline. Green lending does not improve asset quality because "green" automatically means safe. It improves asset quality when environmental risk becomes part of serious credit analysis and when banks use green lending to correct historical underpricing of regulatory, technological, and transition-related vulnerabilities. Under those conditions, green credit enhances portfolio resilience by reallocating funds away from sectors prone to long-term deterioration and toward borrowers better positioned to remain viable in a changing policy and market environment.

At the same time, the literature shows clearly that this effect is conditional. Bank ownership, scale, monitoring capacity, project type, taxonomy quality, and policy design all shape whether green lending becomes a form of prudent selection or a performative expansion of labeled assets. The reduction in NPL ratios is therefore not a reward attached to the word "green"; it is the result of whether banks have genuinely improved the substance of risk governance.

The most persuasive conclusion is thus neither celebratory nor dismissive. Green credit is not a financial miracle, but neither is it a mere symbolic gesture. It is best understood as a contested but increasingly necessary evolution in lending logic. Where implemented credibly, it can lower non-performing loans and improve bank asset quality. Where implemented superficially, it can simply postpone the

recognition of risk under a more fashionable label.

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