Dean&Francis
ISSN 2959-6130

FinTech and the Identification of Green Financing: The Alternative Data Value of Enterprise Carbon Accounts

Kaiyuan Liu

Business School of Nanfang College, Guangzhou, Guangdong, 510970, China
Email: warfieldastra@gmail.com

Abstract:

As digital finance and the green transition advance in parallel, financial institutions face a growing need to identify firms' green attributes and the quality of their low-carbon transition. However, traditional financial statements, collateral, and static credit information often fail to adequately capture corporate carbon performance, giving rise to persistent problems in green financing, including information asymmetry, high identification costs, and greenwashing risks. From a FinTech perspective, this paper conceptualizes enterprise carbon accounts as a form of alternative data infrastructure in the context of green finance and examines their functions and limitations in the identification of green financing. Drawing on a literature review and case analysis, the paper develops an analytical framework centered on data supplementation, standardized identification, and dynamic tracking, and supports the analysis with regulatory policies, local pilot programs, and banking practices in China. The analysis suggests that, by providing dynamic, structured, and comparable carbon-related information, enterprise carbon accounts can, to some extent, mitigate information asymmetry in green financing and improve the informational basis for green-entity identification, financing pricing, and post-loan management. Their effectiveness, however, remains constrained by data quality, the degree of standardization, platform interoperability, and the digital application capabilities of financial institutions. Overall, enterprise carbon accounts are emerging as an important source of alternative data for the identification of green financing, but at the current stage they are better understood as a supportive financial infrastructure than as an independent substitute for traditional credit assessment.

Keywords: FinTech; Identification of green financing; Enterprise carbon accounts; Alternative data; Green finance

1. Introduction

The development of FinTech is reshaping the ways in which financial institutions process information and allocate resources. For a long time, credit decisions have relied primarily on standardized information such as financial statements, collateral, and historical default records. Yet, in the context of the digital economy and the accelerating green transition, traditional data alone are no longer sufficient to identify firms' actual operating conditions, risk profiles, and transition quality [1][2]. This challenge is particularly salient in green financing, where firms' green attributes, carbon performance, and low-carbon transition progress are characterized by strong non-financial features. Conventional financial indicators often fail to capture these dimensions adequately, thereby intensifying information asymmetry in financial resource allocation [3][4].

In recent years, alternative data have increasingly entered systems of credit evaluation, risk identification, and financial pricing as an important supplement to traditional financial and credit information. Existing studies suggest that alternative data are typically characterized by diversified sources, high update frequency, and rich descriptive dimensions, and can help address the limitations of traditional data in timeliness, completeness, and behavioral representation [1][2]. In FinTech lending contexts, non-traditional data have also been shown to identify some borrowers who are underestimated by conventional scoring systems and to improve risk pricing and credit access under certain conditions [5][6][7].

However, current research on alternative data remains concentrated mainly in consumer lending, online lending, and platform-based credit assessment, while the green finance dimension is still underexplored [5][6]. At the same time, the key difficulty in green financing lies not merely in insufficient capital supply, but in the weakness of the identification foundation itself. Financial institutions often struggle to distinguish genuinely green firms from those with greenwashing tendencies, and they also face difficulties in continuously tracking the real progress of firms' green transition [3][4]. Against this backdrop, enterprise carbon accounts, as data tools for recording, measuring, and evaluating corporate carbon emissions, carbon reductions, and carbon performance, have begun to show important potential for financial applications [8][9].

In essence, enterprise carbon accounts do not belong to the conventional contents of traditional financial statements or standard credit reporting systems. Yet they can reflect key non-financial information about firms' green operations and low-carbon transition and, through digital platforms and algorithmic models, be transformed into usable data resources [8][3]. Therefore, enterprise carbon accounts are not merely tools of environmental governance; they may also constitute a form of alternative data infrastructure in the context of green financing. With the continued advancement of local pilot programs, regulatory policies, and banking practices, enterprise carbon accounts are gradually being embedded into credit approval, loan pricing, post-loan monitoring, and the design of green financial products, showing a transition from environmental information tools to financial identification tools [9][10][11].

Against this background, this paper focuses on three related questions concerning the financial use of enterprise carbon accounts in green financing: Why can enterprise carbon accounts be understood as a form of alternative data? Through what mechanisms do they influence the identification of green financing? And to what extent is this mechanism supported by current Chinese policy and market practice? Addressing these questions helps extend the study of alternative data into the field of green finance and clarifies, from a FinTech perspective, how the identification capacity of green financing may be strengthened in practice.

The contribution of this paper lies in clarifying a conceptual and practical linkage that has received limited systematic discussion. It argues, first, that enterprise carbon accounts should be understood as a financially relevant form of alternative data in green financing and, second, that their value can be examined through the mechanisms of data supplementation, standardized identification, and dynamic tracking.

2. Literature Review and Conceptual Clarification

2.1 . The Financial Functions of Alternative Data

Alternative data generally refer to non-traditional information that differs from conventional financial statements, standard credit data, and publicly disclosed information [1][2]. Their sources are broad and may include transaction records, logistics information, platform behavior data, geolocation data, device usage data, social network data, and sensor-generated data [1]. Existing studies in China note that alternative data are characterized by large volume, rapid circulation, and diverse forms, and are mainly applied in areas such as earnings forecasting and risk warning [1]. Other studies further argue that alternative data can improve data insufficiency, weak credit assessment, and low information-matching efficiency in technology-enabled financial services [2].

From a functional perspective, the financial value of alternative data is reflected mainly in three aspects. First, they expand information coverage and reduce blind spots

ISSN 2959-6130

caused by missing traditional credit information. Second, they enhance the dynamism and granularity of information, allowing financial institutions to observe behavioral changes and operating conditions in a more timely way. Third, through digital platforms and model-based processing, they incorporate dispersed and unstructured information into standardized decision-making processes [2][7]. International evidence similarly shows that the use of non-traditional data by FinTech platforms can identify borrowers who are undervalued by conventional scoring systems and improve risk pricing [5][6].

At the same time, existing research also emphasizes that alternative data do not automatically lead to greater fairness or better identification outcomes. While they may broaden financial inclusion in some contexts, they can also generate digital discrimination, algorithmic bias, and privacy risks [12]. The value of alternative data, therefore, should be assessed from both technological and institutional perspectives.

2.2 . The Concept and Data Attributes of Enterprise Carbon Accounts

Enterprise carbon accounts are data tools used to record, calculate, evaluate, and manage corporate carbon emissions, carbon reductions, and carbon performance. Studies on carbon accounts in China suggest that they are not only tools for carbon accounting, but also micro-level data governance mechanisms that define carbon footprints, emission boundaries, and emission-reduction contributions, thereby supporting broader market-based arrangements [8]. Practical discussions further indicate that carbon accounts can be embedded into green-finance scenarios through digital platforms, carbon-credit reporting, and differentiated financial services [9][3].

This means that enterprise carbon accounts are not merely environmental ledgers. Rather, they are data-based institutional arrangements integrating measurement, evaluation, and practical application. In terms of data attributes, enterprise carbon accounts clearly exhibit the characteristics of alternative data. First, they are not part of the established contents of traditional financial statements or standard credit reporting systems. Second, they reflect non-financial information generated in firms' green operations and low-carbon transition. Third, in financial settings, their significance lies not in replacing financial data, but in supplementing financial institutions' ability to identify firms' environmental performance [8][3]. Defining enterprise carbon accounts as a form of alternative data in green financing is therefore theoretically well grounded.

To further clarify why enterprise carbon account data can be regarded as a distinctive form of alternative data in green financing, it is helpful to compare them with both traditional credit data and general alternative data across several dimensions. Table 1 summarizes the differences in data sources, core attributes, update frequency, relevance to green transition, and practical functions in financing identification. This comparison helps illustrate that the value of enterprise carbon accounts lies not merely in adding more information, but in providing data that are more directly connected with green identification and transition assessment.

Table 1. Comparison among Traditional Credit Data, General Alternative Data and Enterprise Carbon Account Data

Dimension	Traditional Credit Data	General Alternative Data	Enterprise Carbon Account Data
Main sources	Financial statements, credit records, collateral, default history	Platform behavior, transaction records, logistics data, device usage, geolocation, social networks	Energy consumption data, carbon emission data, carbon reduction data, carbon intensity and carbon performance evaluation data
Data attributes	Highly standardized and strongly finance oriented	Non-traditional, diverse, and structurally complex	Non-financial, but highly relevant to green finance identification
Update frequency	Relatively low and periodic	Higher, sometimes close to real-time	Medium to high, depending on collection and accounting mechanisms
Whether part of the conventional credit core system	Yes	No	No
Ability to reflect green transition	Weak	Depends on specific scenarios	Strong
Role in identifying green financing	Provides basic judgment of creditworthiness and repayment capacity	Supplements blind spots in traditional data and enhances behavioral and operational profiling	Supports green attribute identification, carbon performance evaluation, and dynamic tracking

Dimension	Traditional Credit Data	General Alternative Data	Enterprise Carbon Account Data
Main strengths	Standardized, stable, and directly usable in credit decisions	Rich information dimensions, stronger dynamics, broader coverage	Directly linked to green finance goals and can connect identification, pricing, and post-loan management
Main limitations	Cannot adequately reflect green performance and transition quality	May involve bias, privacy concerns, and algorithmic risks	Constrained by data quality, standardization, interoperability, and application capability

Source: Compiled by the author based on the relevant literature

As shown in Table 1, enterprise carbon account data differ from both traditional credit data and general alternative data in one particularly important respect: they are more directly oriented toward the assessment of firms' green attributes, carbon performance, and transition processes. This means that their significance cannot be fully understood through a general discussion of data diversification alone. Rather, their practical value depends on the specific identification task they are expected to support. For this reason, it is necessary to further clarify what "the identification of green financing" actually means and why this process poses special challenges for financial institutions.

2.3 . The Meaning of Green Financing Identification

In this paper, the identification of green financing refers to the judgment and classification processes through which financial institutions identify, screen, and support green entities or green projects. This process involves not only determining whether an entity is "green," but also assessing how green it is and whether its transition is genuine.

Unlike ordinary credit identification, green financing identification concerns not only repayment capacity, but also non-financial dimensions such as environmental performance, changes in carbon intensity, and the quality of low-carbon transition. In practice, it faces three major difficulties. First, financial institutions often find it difficult to distinguish genuinely green firms from greenwashing firms. Second, ex ante identification relies heavily on static application materials and lacks continuous verification. Third, carbon-related and environmental information is often fragmented, non-standardized, and costly to use [3][4]. This suggests that the core issue in green financing is not only whether capital is available, but whether green targets can be identified accurately.

2.4 . Literature Assessment

Existing studies have already developed a relatively rich discussion of alternative data, but their main applications remain concentrated in consumer finance, platform credit assessment, and online lending, with insufficient attention paid to green finance [5][6][7]. Studies on enterprise carbon accounts, by contrast, focus primarily on carbon accounting, institutional design, and local pilot programs, while their role in financial identification remains less systematically discussed [8][9]. Research at the intersection of FinTech and green finance has acknowledged the role of digital technologies in green identification, but still does not adequately explain why enterprise carbon accounts qualify as alternative data or how they enter the process of green financing identification [3].

For this reason, the following analysis places enterprise carbon accounts within the intersecting framework of alternative data and green financing identification, with the aim of clarifying both their conceptual status and their practical mechanisms.

3. The Alternative Data Value of Enterprise Carbon Accounts: Mechanism Analysis

3.1 . Data Supplementation: Mitigating Information Asymmetry

The primary challenge in green financing is information asymmetry. Compared with ordinary lending, green financing requires financial institutions not only to assess firms' financial and repayment capacities, but also to identify their carbon performance, transition progress, and the authenticity of their green attributes. However, such information is often dispersed across energy use records, production processes, equipment upgrades, and emission-reduction investments, and is therefore difficult to capture fully through traditional financial statements [3][4].

The first layer of value provided by enterprise carbon accounts lies in their supplementation of traditional financial information. By recording total carbon emissions, carbon intensity, reduction contributions, and changes in carbon performance, enterprise carbon accounts transform environmental information that would otherwise be difficult to incorporate into financial processes into observable and usable data resources [8][9]. From the perspective of information economics, this enhances the observability of green performance, helps alleviate adverse selection, and improves financial institutions' preliminary identification of green entities.

ISSN 2959-6130

3.2 . Standardization: Improving Comparability and Screening Efficiency

The identification of green financing requires not only the presence of data, but also data that are comparable. If firms differ substantially in accounting standards, data collection methods, and disclosure frequency, financial institutions will find it difficult to conduct low-cost horizontal comparisons and stratified screening, even when large amounts of information are available.

A key institutional value of enterprise carbon accounts is that they usually rely on unified accounting frameworks, algorithmic models, and evaluation standards to convert corporate carbon performance into more comparable structured data [9][4]. For instance, by comparing firms' carbon intensity with industry benchmarks and assigning ratings or labels accordingly, financial institutions can identify priority targets more efficiently and engage in differentiated credit classification and product matching. In local practices such as Quzhou, enterprise carbon accounts have already been used for enterprise labeling and the generation of "carbon credit reports," and have entered banking procedures such as credit approval and differentiated pricing [9]. The second layer of value of enterprise carbon accounts, therefore, lies in lowering the standardization costs involved in green financing identification.

3.3 . Decision Embedding: Improving Financing Pricing and Resource Allocation

An improvement in green financing identification should not be understood merely as faster identification; more importantly, it should lead to more targeted allocation of financial resources. In traditional green credit practices, green labels are often only loosely connected to actual financing conditions. Preferential interest rates, credit limits, and product design do not always adequately reflect differences in firms' green performance, largely because of insufficient verifiable and quantifiable data [3].

Once enterprise carbon accounts are embedded into credit approval and pricing models, financial institutions can implement differentiated financing arrangements based on firms' carbon performance. In this sense, enterprise carbon accounts improve not only identification itself, but also the allocation that follows identification [9][3]. The enhancement of green financing identification is therefore reflected in more targeted resource allocation, better-grounded financing pricing, and more operational green incentives.

3.4 . Dynamic Tracking: Strengthening Post-Loan Management

A notable weakness in traditional green financing is the disconnection between ex ante identification and post-loan tracking. Financial institutions may pay considerable attention to application materials and green statements before lending, but after disbursement they often lack low-cost and sustainable monitoring tools, making it difficult to determine whether firms continue to maintain carbon-reduction performance. As a result, the authenticity of green financing may be weakened.

Enterprise carbon accounts usually have dynamic updating features. They can continuously record changes in corporate carbon emissions, carbon reductions, and energy use, enabling financial institutions to observe firms' green performance after loan disbursement on an ongoing basis. Existing Chinese studies have pointed out that carbon accounts inherently possess the function of dynamically monitoring the carbon-reduction behavior of social actors [8]. Practical experience further shows that banks can compare carbon credit reports across different periods to conduct post-loan carbon-efficiency assessments for both project financing and non-project financing [9]. Enterprise carbon accounts therefore extend green financing identification from static ex ante screening to full-process post-loan management.

3.5 . Boundaries and Potential Risks

Despite their strong application potential, the role of enterprise carbon accounts is not unconditional. At least four constraints should be noted.

Firstly, there is a data quality constraint. If carbon data are incomplete, inconsistent in accounting methods, or vulnerable to manipulation, enterprise carbon accounts may become merely formalistic [8][4].

Secondly, there is a fragmentation constraint in standards. Differences across local pilot programs in indicator systems, algorithmic logic, and application depth weaken cross-regional comparability [8][4].

Thirdly, there is an application capability constraint. Even when carbon account data are available, financial institutions may still fail to improve identification quality if they lack the capacity to embed such data into credit approval, pricing, and risk management processes [3].

Finally, there are governance and fairness risks. As a form of alternative data, enterprise carbon accounts may generate new governance and bias problems once combined with other data in decision models, and this broader category of risk has already been discussed in the literature on alternative-data-based credit assessment [12].

A more careful judgment, therefore, is that enterprise carbon accounts improve the informational conditions for green financing identification, but do not by themselves guarantee better identification outcomes. Their practical value still depends on data quality, standardized rules, and the ability of financial institutions to embed such data into actual business processes.

4. Practical Support: Policies, Local Pilots, and Banking Practices

4.1 . Policy Support: Enterprise Carbon Accounts Have Entered the Institutional Horizon of Green Finance

From an institutional perspective, enterprise carbon accounts are moving from local exploration into a clearer policy framework for green finance. Recent regulatory documents in China have explicitly encouraged qualified banking and insurance institutions to make fuller use of carbon-related data such as enterprise carbon accounts and personal carbon accounts, and to expand green financial service scenarios related to carbon accounts [10]. This suggests that regulators have begun to regard carbon-related data as an important information source for green finance rather than merely an auxiliary tool of environmental administration.

Local policy initiatives further reinforce this direction. In some regions, action plans for carbon finance have proposed relying on carbon accounts of key industrial enterprises and incorporating carbon-emission conditions into credit approval, loan pricing, and carbon-efficiency assessment systems [13]. Municipal carbon-peaking plans have likewise provided broader policy space for enterprise carbon data platforms and green financial applications within the wider agenda of urban green transition and digital governance [14]. These developments indicate that the institutional foundation of enterprise carbon accounts is gradually expanding from isolated pilot programs toward broader policy support.

4.2 . Local Pilots: The Chain-Based Application in Quzhou

Among local practices, the Quzhou model is particularly representative. Its basic logic is to build enterprise carbon accounts based on energy big-data centers and ecological-environmental data, use algorithmic models to assess and label firms' carbon performance, and then transform the results into "carbon credit reports" that can be used by banks for credit approval, loan pricing, and post-loan evaluation [9][4].

The significance of this model lies in its integration of the chain from carbon data to carbon evaluation to green credit. In one illustrative case, a commercial bank issued a "green emission-reduction loan" to a hydrogen peroxide producer on the basis of the firm's carbon account and the improvement in its carbon-neutrality rate following technological upgrading, while also offering an interest-rate preference [9]. This case shows that enterprise carbon accounts in practice already serve three financial functions: identifying green transition entities, supporting differentiated loan pricing, and facilitating post-loan carbon-efficiency evaluation. In other words, they have moved beyond backstage statistical tools and begun to enter the core processes of financial business.

4.3 . Banking Practices: Trends Toward Platform-Based and Large-Scale Application

If local pilot programs show that enterprise carbon accounts can indeed be established, banking practice better illustrates whether they can actually be used at scale. In this regard, public information released by Industrial Bank is particularly representative. According to the bank's public disclosures, it has launched an enterprise-level dual-carbon management platform, established carbon accounts for clients, and used big data, cloud computing, and artificial intelligence to carry out the digital management of carbon emissions, carbon reductions, and carbon assets, thereby building a large-scale system of enterprise carbon accounts [11].

More importantly, such platforms have not remained at the level of information display, but have entered concrete product design and business processes. Public disclosures suggest that, by relying on enterprise carbon account systems, the bank has implemented scenarios such as carbon-reduction-linked loans, carbon-emission dual-control-linked loans, and the revitalization of green assets in multiple locations [11]. Public reports also show that its green loan balance had exceeded one trillion yuan by the end of the first quarter of 2025, indicating a substantial scale of green-finance-related business development [15]. While this does not by itself prove the causal effect of carbon accounts, it does indicate that enterprise carbon accounts are becoming an important data foundation for banks in identifying clients' green performance, designing green financial products, and optimizing resource allocation.

4.4 . Overall Assessment

Taken together, policy documents, local pilot programs, and banking cases show that enterprise carbon accounts already have a realistic basis for entering the process of green financing identification, and that this direction shows substantial practical feasibility. The supporting factors mainly include clear regulatory encouragement for the use of carbon accounts in green finance, active government efforts to build carbon-account-centered data platforms, and the formation of scenario-based applications by commercial banks [10][4][11].

At the same time, however, it must also be acknowledged that enterprise carbon accounts are still at a stage of institutional adjustment and diffusion. Regional differences in accounting standards, evaluation models, and platform structures have not yet been fully resolved; the availabil-

ISSN 2959-6130

ity and accuracy of enterprise carbon data vary across industries; and the depth of application among financial institutions remains uneven [8][3][4]. A more accurate description at present, therefore, is not that enterprise carbon accounts are already mature enough to comprehensively improve green financing identification, but rather that they are gradually becoming an important data condition and institutional support for such improvement.

To present this practical foundation more clearly, Table 2 summarizes the major forms of support from policy documents, local pilot programs, urban governance initiatives, and banking practices, together with their significance for the identification of green financing.

Table 2. Practical Support for Integrating Enterprise Carbon Accounts into the Identification Process of Green Financing

Level of support	Representative material or case	Core content	Significance for identifying green financing
Policy level	Implementation Plan for the High Quality Development of Green Finance in the Banking and Insurance Sectors	Encourages qualified banking and insurance institutions to use enterprise carbon accounts and other carbon-related data to expand green finance service scenarios	Provides institutional legitimacy for bringing enterprise carbon accounts into green financing processes
Local policy level	Shandong Province Carbon Finance Development Three Year Action Plan 2023 to 2025	Proposes using industrial carbon accounts of key enterprises and incorporating carbon-emission information into credit approval, loan pricing, and carbon-efficiency assessment	Pushes enterprise carbon accounts from policy advocacy toward operational institutional arrangements
Urban governance level	Guangzhou Implementation Plan for Carbon Peaking	Provides broader scenario support for enterprise carbon data platforms and green finance applications from the perspective of urban green transition and digital governance	Creates a supportive environment for platform-based construction and application expansion
Local pilot level	Quzhou carbon account finance practice	Builds enterprise carbon accounts, generates carbon credit reports, and embeds them into credit approval, differentiated pricing, and post-loan evaluation	Demonstrates that enterprise carbon accounts can connect carbon data, carbon evaluation, and green credit
Banking practice level	Industrial Bank dual-carbon management platform	Establishes enterprise carbon accounts and applies them in carbon-reduction linked loans and carbon emission control linked loans	Shows the potential for platform-based, product-based, and large-scale application
Overall assessment	Joint advancement by policy, pilots, and banking cases	Enterprise carbon accounts are shifting from environmental governance tools to financial identification tools	Indicates that they are gradually becoming important data conditions and institutional support for green financing identification

Source: Compiled by the author based on policy documents, local pilot programs, and publicly available banking materials

The evidence summarized in Table 2 points not to the existence of a single mature model, but to the gradual formation of an institutional chain linking regulation, local experimentation, and banking application. Although this chain remains uneven and incomplete, it nevertheless suggests that enterprise carbon accounts are moving from environmental governance instruments toward financially relevant identification tools.

5. Conclusion and Implications

From a FinTech perspective, this paper examines the alternative data value of enterprise carbon accounts in the identification of green financing. The analysis suggests that enterprise carbon accounts are not merely tools for recording environmental information; rather, they constitute a form of alternative data infrastructure with financial identification functions. By transforming information on corporate carbon emissions, carbon reductions, and carbon performance into dynamic, structured, and comparable data, enterprise carbon accounts can, to some extent,

alleviate information asymmetry in green financing and improve the informational basis for decision-making in green-entity identification, financing pricing, and post-loan tracking.

The analysis of policy documents, local pilot programs, and banking practices further suggests that enterprise carbon accounts have already shown notable application potential in China's green finance development. Regulatory encouragement for bringing carbon-related data into green finance, the advancement of local carbon-account platforms, and commercial banks' product innovations built around enterprise carbon accounts together indicate that they are becoming an increasingly important support tool for green financing identification.

At the same time, their role should be assessed cautiously. At the current stage, the financial application of enterprise carbon accounts is still constrained by data quality, standardization, platform interoperability, and the digital capabilities of financial institutions. They are not yet sufficient to replace traditional credit assessment entirely, and are better regarded as a supportive infrastructure for strengthening green financing identification.

Based on this analysis, three implications may be drawn. First, regulators should accelerate the development of standards, interfaces, and data-governance rules related to enterprise carbon accounts so as to improve comparability across regions and platforms. Second, financial institutions should strengthen their capability to embed carbon-related data into business processes, thereby enabling enterprise carbon accounts to truly enter credit approval, loan pricing, and post-loan management. Third, firms should improve their carbon data governance capacities and regard carbon accounts as an important interface connecting low-carbon transition with financing capability.

Overall, the significance of enterprise carbon accounts lies not merely in recording corporate carbon behavior, but in reflecting a broader transformation in the logic of financial identification in the era of digital finance: financial resource allocation is becoming increasingly dependent on computable non-financial data, and enterprise carbon accounts represent a concrete manifestation of this trend in the field of green financing.

References

[1] Liu, Y. (2021). The development status and future trends of alternative data in the financial sector. China High-Tech, (19), 104-105, 130.

[2] Xie, L., Tang, M., & Ren, B. (2019). An application study of alternative data in technology finance services. China Science and Technology Resources Review, 51(5), 15-20.

[3] Xue, C. (2023). Theoretical logic, current situation, and policy suggestions for FinTech-enabled carbon finance development in commercial banks. Southwest Finance, (3), 16-26.

[4] World Resources Institute China Office. (2025, July 10). How can enterprise carbon account platforms empower enterprises and financial institutions to conduct digital and intelligent carbon accounting, carbon rating, and carbon finance? https://wri.org.cn/guandian

[5] Jagtiani, J., & Lemieux, C. (2019). The roles of alternative data and machine learning in fintech lending: Evidence from the LendingClub consumer platform (Federal Reserve Bank of Philadelphia Working Paper No. 18-15, revised January 2019). https://doi.org/10.21799/frbp.wp.2018.15

[6] Di Maggio, M., Ratnadiwakara, D., & Carmichael, D. (2022). Invisible primes: Fintech lending with alternative data (NBER Working Paper No. 29840).

[7] Lu, T., Zhang, Y., & Li, B. (2019). The value of alternative data in credit risk prediction: Evidence from a large field experiment. In ICIS 2019 Proceedings.

[8] Sun, C., & Wei, X. (2022). Models, experience, and future directions of carbon account development in China under the dual-carbon agenda. Southeast Academic, (6), 197-207.

[9] He, Q. (2021). Green finance exploration centered on carbon accounts. China Finance, (18), 56-57.

[10] General Office of the National Financial Regulatory Administration, & General Office of the People's Bank of China. (2025). Implementation plan for the high-quality development of green finance in the banking and insurance sectors.

[11] Industrial Bank. (2025a, February 18). Facilitating better carbon accounting: Industrial Bank's innovation in digital services for dual-carbon management. https://www.cib.com.cn/cn/aboutCIB/about/news/2025/20250218_1.html

[12] Pang, D., & Li, S. (2022). The impact of alternative-data-based credit reporting on credit fairness and future prospects. Taxation and Economy, (4), 57-64.

[13] Shandong Province Carbon Finance Development Three-Year Action Plan Draft. (2023). Shandong Province carbon finance development three-year action plan 2023-2025 draft for comments.

[14] Guangzhou Municipal People's Government. (2023). Implementation plan for carbon peaking in Guangzhou.

[15] Industrial Bank. (2025b, May 15). Industrial Bank's green loan balance exceeded one trillion yuan. https://www.cib.com.cn/cn/aboutCIB/about/news/2025/20250515_1.html