Measurement System of China's Green Finance: Indicators, Methods and Research Divergences

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Abstract. Guided by China's dual-carbon goals and ecological civilization construction strategy, green finance has become a core driver for the green and low-carbon transformation of the economy and society. Scientific measurement of its development level is a prerequisite for policy formulation, resource allocation and performance assessment. Domestic research on green finance measurement has grown rapidly in recent years, yet scholars have not reached a unified agreement on concept definition, dimension classification, indicator screening and weighting approaches, and inconsistent measurement frameworks produce vastly different evaluation results and hinder effective horizontal comparison and longitudinal trend tracking. This paper systematically sorts out core concepts and hierarchical frameworks of green finance measurement, concludes mainstream research modes from indicator evolution and method selection, compares the applicable scenarios, merits and drawbacks of subjective and objective weighting, and analyzes prominent disputes including indicator homogenization, insufficient data availability and arbitrary method selection. The research finds that green credit, green bonds and green insurance have become core measurement carriers, while unified standards for dimension coverage, weight setting and data standardization are still absent. Subjective weighting depends on expert experience and is vulnerable to personal preference, whereas objective weighting eliminates artificial bias yet may ignore practical policy logic. In the future, a unified measurement framework integrating policy orientation, standardized data and stable methodologies should be constructed to improve the comparability, scientificity and practical value of green finance evaluation and offer theoretical support for high-quality green finance development.

Keywords: Green Finance, Measurement System, Indicator Construction, Weighting Method, Research Divergence.

1 Introduction

Global climate governance is accelerating worldwide, making green and low-carbon economic transformation a crucial development priority for all countries. Having proposed the carbon peaking goal by 2030 and carbon neutrality goal by 2060, China has incorporated green development into its national core development strategy. As an important medium connecting financial capital and green industries green finance

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channels funds toward energy conservation, environmental protection, clean energy and green infrastructure sectors to optimize economic structure and improve ecological conditions. Benefiting from continuous policy upgrades ranging from top-level institutional design to local practical implementation, China's green financial products, including green credit, green bonds, green funds, green insurance and carbon finance, have achieved remarkable expansion, forming one of the world's most advanced green financial markets. Against such a backdrop, accurate quantification of green finance development and scientific assessment of relevant policy effects have attracted widespread attention from both academic and industrial practitioners.

Green finance measurement refers to quantitative evaluation of the development scale, coverage, operational efficiency and implementation outcomes of green finance, which has three core practical values. First, it provides empirical evidence for policy-making; measurement findings identify developmental weaknesses of green finance across different regions and financial institutions, supporting regulators to optimize policy instruments and improve incentive and constraint mechanisms [1]. Second, it optimizes resource allocation; standardized measurement guides financial institutions, enterprises and investors to reasonably allocate green assets and boost capital utilization efficiency [2]. Third, it lays the fundamental foundation for academic research; unified indicators and calculation methods are essential prerequisites for empirical studies on green finance's influencing factors, spatial spillover and economic effects [1].

At present, there is no universally accepted unified standard for green finance measurement. Scholars establish differentiated evaluation systems according to varied research perspectives, data sources and research purposes. Some researches focus on single green financial instruments, while others construct multi-dimensional composite indexes; some adopt subjective weighting techniques, and others choose objective algorithm models; existing studies cover national macroeconomy, provincial regions or single financial institutions respectively. Such diversified settings reduce the comparability and reliability of existing research conclusions and restrict practical policy implementation. Therefore, focusing on China's green finance measurement system, this paper systematically reviews indicator design, method application and core research controversies, summarizes advantages and limitations of existing literature, and puts forward suggestions for establishing standardized measurement criteria.

This paper aims to organize the conceptual framework, indicator system, research methodologies and divergent viewpoints of green finance measurement and summarize mainstream research patterns and unresolved drawbacks for optimization proposals. In theory, this study integrates scattered research achievements, clarifies measurement logic and controversial issues to provide references for subsequent related studies. In practice, it delivers operable measurement ideas for regulators, financial institutions and researchers to promote standardized green finance evaluation and facilitate high-quality industrial development.

2 Concept Sorting

2.1 Green Finance and Its Quantitative Measurement

Green finance consists of all financial activities in which financial entities incorporate environmental impacts into financing decisions and allocate capital toward environmentally friendly industries to realize coordinated economic, social and ecological benefits. Its essence is the internalization of environmental externalities, cutting financing costs of green projects and limiting capital inflows into high-pollution and high-energy-consuming industries [3]. Such financial activities are named sustainable finance or climate finance globally, while the domestic definition in China highlights its function in supporting ecological civilization construction and the dual-carbon targets.

Green finance measurement adopts statistical and econometric tools to quantify the development scale, structural features, operational efficiency and socioeconomic influence of green finance. Its core objectives include four aspects: to objectively reflect real development status; to support horizontal comparison among countries, regions and institutions as well as longitudinal time-series analysis; to underpin policy formulation, market supervision and investment decision-making; to identify developmental bottlenecks and promote the high-quality upgrading of the green finance industry.

2.2 Hierarchical Framework of Green Finance Measurement

Green finance measurement features multi-level and multi-agent attributes, and mainstream evaluation frameworks are divided into four tiers. First, national macro level: Researchers build composite green finance development indexes to evaluate nationwide industrial progress, focusing on policy perfection, market scale and international cooperation for macro policy assessment and cross-country comparison. Second, provincial regional level: Relevant researches assess provincial green finance competitiveness and developmental gaps, analyzes regional differentiation, spatial spillover and convergence to support coordinated regional economic development. Third, institutional level: Evaluations target commercial banks, insurance companies and fund enterprises, measuring their green business scale, product innovation, risk management and operating profits to quantify institutional green transformation progress. Fourth, policy level: This tier evaluates policy implementation effects, including landing efficiency, incentive effectiveness and market feedback, examining the rationality of existing policies and feasible optimization directions.

The four layers are closely interconnected: macro measurement guides micro practical operation, and micro statistical data provides basic support for macro comprehensive assessment, jointly forming a complete green finance measurement system [4].

3 Indicator Selection: Phased Evolution of Measurement Contents

3.1 Division of Evaluation Dimensions

Dimension setting of measurement indicators has evolved from single-factor evaluation to comprehensive multi-dimensional assessment, with three mainstream classification standards widely adopted. Scale dimension measures the overall business volume of green finance to reflect market coverage scope, serving as the most basic evaluation perspective. Structure dimension focuses on product composition, regional layout and industrial distribution of green finance to reflect development quality and balanced growth. The efficiency dimension assesses capital allocation efficiency, environmental benefits and economic returns to measure the sustainable development capacity of green finance.

Most existing studies follow the three-dimensional framework of scale-structure-efficiency; several studies add policy support, risk management and international cooperation to expand into four or five evaluation dimensions. The core evolving logic shifts from quantitative scale measurement to quality assessment and final efficiency evaluation for comprehensive development appraisal.

3.2 Practical Application of Specific Indicators

Centered on mainstream green financial products, measurement indicators have achieved continuous improvement in operability, among which green credit indicators enjoy complete official statistics and the widest application scope. Green credit indicators mainly include outstanding green loan balance, its proportion in total loans, growth rate, asset quality and industry-specific loan distribution ratio. With reliable and accessible official data, these indicators become the core component of most measurement systems [5]. Green bond indicators cover issuance scale, issuance quantity, proportion in total credit bonds, maturity structure and issuer distribution, reflecting the development of the direct green financing market. Green insurance indicators adopt premium income, compensation ratio, number of insured enterprises and total environmental risk guarantee limit to manifest the risk hedging function of green insurance. Supplementary indicators include green fund scale, carbon trading turnover, green trust volume and quantity of listed green enterprises.

The development of the indicator system follows the path from single-scale statistics to multi-dimensional comprehensive evaluation and from volume-oriented measurement to benefit assessment, continuously deepening the precision of green finance quantification.

4 Methodology Selection: Disputes Over Measurement Approaches

4.1 Subjective Weighting Methods

Subjective weighting calculates indicator weights based on expert experience and theoretical logic, matching practical policy design but susceptible to subjective human preference. Analytic Hierarchy Process (AHP) stratifies complicated evaluation problems and builds a comparison matrix to compute weights, widely used in multi-index comprehensive evaluation. It has systematic structural advantages and a high policy matching degree, yet the judgment matrix is easily affected by personal subjective preference and brings difficulties in consistency inspection [6]. Delphi Method determines weights via multiple rounds of anonymous expert consultation and opinion convergence, suitable for fields without unified evaluation benchmarks. This method makes full use of industrial expert experience, but it requires long research cycles and still cannot eliminate subjective deviation fundamentally.

Subjective weighting fits measurement with strong policy attributes and complicated dimension correlation, while insufficient objectivity remains its major controversial shortcoming.

4.2 Objective Weighting Methods

Objective weighting assigns weights according to inherent data features to avoid artificial intervention, featuring strong objectivity and repeatability but possibly ignoring implicit policy value of certain indicators. Entropy Weight Method assigns higher weights to indicators with greater data dispersion and adapts to panel data research. It boasts simple calculation and objective results but is sensitive to extreme abnormal values and may underestimate indicators with important policy significance [7]. Principal Component Analysis (PCA) realizes data dimension reduction, extracts common factors to calculate composite scores and eliminates multicollinearity among indicators. It simplifies indicator structure with objective outcomes yet loses partial original information and faces obstacles in factor interpretation. Factor Analysis optimizes PCA via factor rotation to improve result interpretability with stable and economically meaningful evaluation outputs, whereas this method demands large sample capacity for reliable calculation.

Objective weighting has gradually become mainstream in recent literature, yet overreliance on original data and potential separation from policy logic remain core academic disputes.

4.3 Development Trend of Combined Weighting

To combine the respective strengths of subjective and objective weighting, increasing studies adopt hybrid weighting models such as AHP-Entropy Weight and Delphi-Principal Component Analysis. Such composite methods coordinate policy guidance and data objectivity, emerging as an important developing direction of future measurement technologies [8].

5 Discussion

Four prominent controversies exist within current green finance measurement systems. First, inconsistent indicator frameworks: researchers differ greatly in dimension quantity and concrete indicator selection; some focus on scale measurement while others prioritize efficiency evaluation, leading to poor horizontal comparability [9]. Second, unbalanced data availability: green credit statistics are relatively complete, but severe data shortage exists in green insurance and carbon finance fields alongside non-standard information disclosure among regions and financial institutions [9]. Third, diversified preference in method selection: long-term academic arguments persist between subjective and objective weighting; some scholars select calculation methods arbitrarily without matching research conditions and generate biased evaluation results. Fourth, differentiated research orientation: some studies serve theoretical academic exploration while others target practical policy assessment, resulting in diversified framework design.

Such disputes originate from the immature development stage of China's green finance industry, including absent unified statistical standards, incomplete data disclosure rules and diversified research perspectives. Besides, China's green finance is strongly policy-oriented, requiring measurement systems to balance market operation rules and administrative policy goals and further increasing the difficulty of establishing unified evaluation criteria.

Despite existing divergences, academic consensus has been formed that green finance measurement should develop toward multi-level, multi-dimensional and dynamic evaluation modes based on core financial products covering scale, structure and efficiency, and realize gradual standardization and normalization [10].

6 Conclusion

This paper systematically combs the conceptual definition and multi-layer framework of green finance measurement, sorts out the evolving rules of indicator construction and categorizes three mainstream weighting types, including subjective, objective and composite weighting widely applied in existing studies. Research results demonstrate that green credit, green bonds and green insurance constitute core measurement subjects, while inconsistent indicator criteria, diversified weight allocation rules and nonstandard statistical data lead to obvious discrepancies among evaluation outcomes of different measurement systems. Subjective weighting is highly consistent with practical policy design but is inevitably disturbed by experts' subjective preferences; objective weighting ensures data objectivity yet may overlook the practical policy implication of key indicators, which fundamentally causes long-standing academic divergence on method selection of green finance quantification.

For the improvement of China's green finance measurement system, regulators and academia should jointly formulate unified specifications on indicator standards, statistical caliber and weight criteria, completing a data disclosure mechanism for green insurance and carbon finance to ease data shortage problems. Future academic research

is suggested to popularize composite weighting models that balance policy logic and data objectivity, and continuously optimize the measurement framework with updated statistical data and advanced quantitative tools. Along with the gradual standardization of industrial statistics and evaluation methodologies, a universally applicable unified green finance measurement system is expected to be established, providing solid data support for refined policy adjustment and sustainable high-quality development of the domestic green finance industry.

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