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INTERNATIONAL PRACTICES IN THE VALUATION OF MOVABLE ASSETS FOR LOAN COLLATERAL PURPOSES

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Abstract. The valuation of movable assets plays a crucial role in modern secured lending by enabling financial institutions to accurately determine collateral value and effectively manage credit risk. This study examines the theoretical foundations and international practices of movable asset valuation for loan collateral purposes. It analyzes legal frameworks, internationally recognized valuation approaches, professional valuation institutions, and collateral registration systems in the United States, the United Kingdom, Germany, Singapore, China, and Türkiye. The study also highlights the growing role of digital technologies, including artificial intelligence, automated valuation models, blockchain, big data, and machine learning, in improving valuation accuracy and transparency. Based on international experience, the paper identifies the key factors influencing the effective valuation of movable assets and provides recommendations for strengthening collateral valuation systems and promoting more efficient secured lending practices in developing financial markets.

Keywords: movable assets, collateral valuation, secured lending, International Valuation Standards, credit risk, collateral registry, artificial intelligence, automated valuation models, blockchain, digital finance.

Аннотация. Оценка движимого имущества играет важную роль в современной системе обеспеченного кредитования, позволяя финансовым учреждениям точно определять стоимость залога и эффективно управлять кредитными рисками. В данном исследовании рассматриваются теоретические основы и международная практика оценки движимого имущества для целей обеспечения кредитных обязательств. Анализируются правовые механизмы, международно признанные подходы к оценке, деятельность профессиональных оценочных организаций и системы регистрации залога в Соединённых Штатах Америки, Великобритании, Германии, Сингапуре, Китае и Турции. Особое внимание уделяется возрастающей роли цифровых технологий, включая искусственный интеллект, автоматизированные модели оценки, блокчейн, большие данные и машинное обучение, в повышении точности и прозрачности оценочных процедур. На основе международного опыта определены ключевые факторы, влияющие на эффективность оценки движимого имущества, и разработаны рекомендации по совершенствованию систем оценки залога и развитию более эффективных механизмов обеспеченного кредитования на формирующихся финансовых рынках.

Ключевые слова: движимое имущество, оценка залога, обеспеченное кредитование, Международные стандарты оценки, кредитный риск, реестр залогов, искусственный интеллект, автоматизированные модели оценки, блокчейн, цифровые финансы.

INTRODUCTION

The valuation of movable assets as loan collateral is an essential component of the modern financial system. Business entities and individuals frequently use machinery, vehicles, agricultural equipment, industrial equipment, inventories, and other movable assets as collateral to obtain financial resources. Therefore, the objective and reliable assessment of the market value of these assets is a key factor in ensuring the efficiency and security of the lending process.

In lending practices, determining the fair value of movable assets enables financial institutions to assess the adequacy of collateral, justify the loan amount, and mitigate credit risk. Inaccurate or unjustified valuations may result in excessive lending or, conversely, restrict borrowers' access to financing. Consequently, international banking practice places significant emphasis on the engagement of independent professional valuers, compliance with internationally recognized valuation standards, and the regular reassessment of the market value of pledged assets.

The proper valuation of movable assets also contributes to maintaining the stability of loan portfolios. In the event of a borrower's default, financial institutions can recover outstanding obligations through the realization of

pledged assets. When the appraised value closely reflects the actual market value of the collateral, credit risk may be reduced, and the protection of bank capital may be strengthened.

In the era of the digital economy, the valuation of movable assets has undergone significant transformation. The application of artificial intelligence (AI), big data analytics, electronic collateral registries, and automated valuation models (AVMs) has contributed to improvements in the speed, accuracy, and consistency of asset valuation. These technological advancements may reduce loan-processing time, lower operational costs, and enhance the transparency, reliability, and efficiency of valuation procedures.

The valuation of movable assets in lending serves not only as a mechanism for determining the actual value of collateral but also as a critical instrument for credit risk management, financial stability, the efficient allocation of financial resources, and the sustainable development of financial markets. For this reason, the continuous improvement of movable asset valuation systems in accordance with the International Valuation Standards (IVS) is regarded as an important area for strengthening banking and financial systems in many countries.

LITERATURE REVIEW

According to Smith and Warner (1979), collateral serves as one of the most effective contractual mechanisms for mitigating agency conflicts between lenders and borrowers. They argue that secured debt reduces the risk of opportunistic behavior by borrowers because pledged assets provide lenders with a legally enforceable claim in the event of default [1]. Their study emphasizes that collateral strengthens creditor protection, reduces monitoring costs, and improves the efficiency of debt contracts by aligning the interests of both parties.

Bester (1985) proposed that collateral functions as a screening mechanism in credit markets characterized by information asymmetry. His study showed that lenders use collateral requirements to distinguish low-risk borrowers from high-risk borrowers [2]. Consequently, borrowers with stronger financial positions are more willing to pledge assets in exchange for lower borrowing costs, thereby reducing adverse selection.

In the study conducted by Stulz and Johnson (1985), collateral was identified as an important instrument for expanding firms' access to external financing. The authors explained that secured lending lowers lenders' exposure to credit risk and enables firms to finance profitable investment projects that would otherwise remain unfunded [3].

Besanko and Thakor (1987) emphasized that collateral is a key component of optimal loan contract design. Their theoretical model demonstrated that collateral requirements reduce adverse selection and moral hazard while allowing financial institutions to differentiate borrowers according to their risk characteristics [4].

Boot et al. (1991) highlighted that collateral serves not only as a recovery mechanism but also as an incentive device that encourages borrowers to honor their repayment obligations [5]. Their findings indicate that pledged assets reduce default risk and strengthen long-term relationships between banks and borrowers.

Rajan and Winton (1995) found that collateral becomes particularly valuable in financial markets where information asymmetry is significant. Their research suggested that secured lending improves lenders' monitoring capabilities, lowers expected credit losses, and enhances overall loan quality [6].

The theoretical framework developed by Aghion and Bolton (1992) demonstrated that collateral allocation affects both creditor protection and corporate governance [7]. The authors argued that debt contracts should allocate control rights efficiently to minimize conflicts arising from incomplete contracts.

Hart and Moore (1994) developed the incomplete contracting theory to explain the economic role of collateral. Their analysis showed that ownership rights over pledged assets facilitate contract enforcement, strengthen creditor rights, and reduce financing frictions in debt markets [8].

Empirical evidence presented by Campello and Larrain (2016) revealed that legal reforms allowing movable assets to be used as collateral substantially increase firms' access to bank credit [9]. The authors concluded that these reforms are particularly beneficial for small and medium-sized enterprises, which generally possess limited immovable assets but significant amounts of movable property.

RESEARCH METHODOLOGY

This research employs a qualitative comparative research design based on a comprehensive review of international academic literature, legal documents, and institutional reports related to movable asset valuation. The study applies systematic analysis, comparative analysis, synthesis, induction, and deduction methods to examine the theoretical and practical aspects of collateral valuation.

The theoretical framework is developed using internationally recognized publications issued by the International Valuation Standards Council (IVSC), the United Nations Commission on International Trade Law (UNCITRAL), the World Bank, and the Basel Committee on Banking Supervision (BCBS). In addition, empirical

evidence published in Scopus-indexed journals, particularly the *Journal of Banking & Finance*, the *Journal of Financial Economics*, the *Journal of Financial Stability*, and other peer-reviewed sources, is incorporated into the analysis.

A comparative analysis is conducted to evaluate the legal frameworks, valuation methodologies, professional valuation institutions, and collateral registration systems adopted in the United States, the United Kingdom, Germany, Singapore, China, and Turkey. Furthermore, the study assesses the implications of emerging technologies—including artificial intelligence, automated valuation models, blockchain technology, big data analytics, machine learning, and ESG-oriented valuation—for improving the transparency, efficiency, and reliability of movable asset valuation in secured lending.

ANALYSIS AND RESULTS

Movable assets are tangible or intangible properties that can be transferred from one location to another without causing substantial damage to their physical characteristics or economic value. Unlike immovable property, such as land and buildings, movable assets encompass a broad range of economic resources, including machinery, industrial equipment, motor vehicles, agricultural machinery, inventories, raw materials, finished goods, livestock, accounts receivable, intellectual property rights, warehouse receipts, and other transferable assets.

From an economic perspective, movable assets constitute a significant share of business capital. According to the International Finance Corporation (IFC, 2012), movable assets account for nearly 70–80% of the capital stock of enterprises worldwide, particularly among small and medium-sized enterprises (SMEs). However, historically, these assets have been underutilized as collateral because of legal uncertainties, insufficient collateral registration systems, and difficulties in determining their market value. The United Nations Commission on International Trade Law (UNCITRAL, 2016) classifies movable assets into four major categories (Figure 1).

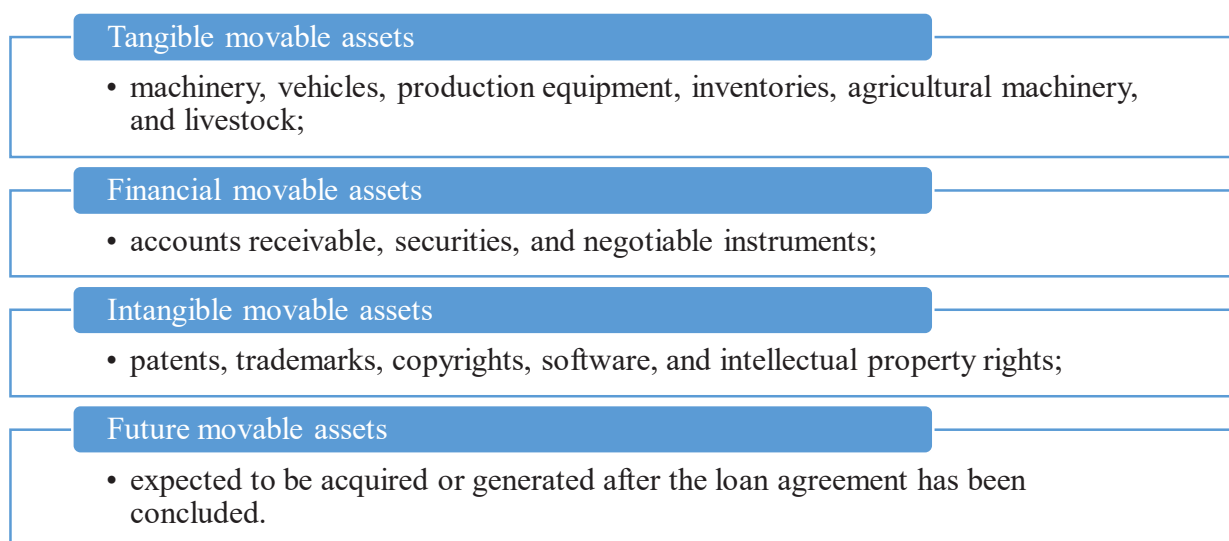


Figure 1. Classification of Movable Assets According to UNCITRAL (2016) [10]

The classification of movable assets provides the conceptual foundation for secured lending because different categories of assets possess distinct economic characteristics, marketability, and legal enforceability. Consequently, financial institutions apply different valuation methodologies depending on the nature of the collateral, its liquidity, expected economic benefits, and market conditions. Therefore, selecting an appropriate valuation approach represents one of the most important stages in collateral-based lending.

The growing use of movable assets in secured lending has contributed to changes in modern credit markets. Traditionally, banks relied primarily on immovable property as collateral because it was easier to identify, register, and liquidate. However, legal reforms implemented in many countries have expanded the range of assets eligible for secured lending.

According to the World Bank (2019, 2021), the most commonly accepted movable assets as collateral include [12, 13]:

- Industrial machinery and manufacturing equipment;
- Agricultural machinery and farming equipment;

Commercial vehicles and transport equipment;
Inventories and warehouse stocks;
Raw materials and finished products;
Accounts receivable and trade receivables;
Warehouse receipts;
Livestock;
Intellectual property rights;
Financial assets and negotiable securities.

The UNCITRAL Model Law on Secured Transactions (2016) emphasizes that modern secured transaction systems should permit the use of both existing and future movable assets as collateral. Such flexibility increases firms' borrowing capacity while improving financial inclusion, particularly for SMEs that possess limited real estate assets.

The valuation of movable assets represents one of the fundamental components of secured lending because it determines the recoverable value of pledged collateral in the event of borrower default. Accurate valuation minimizes information asymmetry between borrowers and lenders while supporting prudent credit risk management.

From an economic perspective, asset valuation aims to estimate fair market value, defined by the International Valuation Standards Council (IVSC, 2025) as:

"the estimated amount for which an asset should exchange between a willing buyer and a willing seller in an arm's-length transaction after proper marketing, where both parties act knowledgeably, prudently, and without compulsion" [11].

International valuation practice generally applies three principal valuation approaches (Table 1).

Table 1
Comparison of the Principal Approaches to Movable Asset Valuation in International Valuation Practice [11]

Valuation Approach	Definition	Primary Basis of Valuation	Typical Movable Assets	Advantages and Limitations
Market Approach	Estimates the value of an asset by comparing it with recently sold comparable assets in active and competitive markets.	Market transaction prices of comparable assets adjusted for differences in age, condition, location, and technical characteristics.	Motor vehicles, agricultural machinery, industrial equipment, construction machinery, standardized inventories.	Advantages: Reflects actual market conditions and investor behavior; highly reliable when comparable market data are available. Limitations: Difficult to apply where active secondary markets or comparable sales data are unavailable.
Cost Approach	Determines value based on the current replacement or reproduction cost of the asset after deducting physical deterioration, functional obsolescence, and economic depreciation.	Replacement cost new – accumulated depreciation.	Specialized machinery, manufacturing equipment, production lines, customized industrial assets.	Advantages: Suitable for unique or specialized assets with limited market evidence. Limitations: Does not directly reflect market demand or future earning potential.
Income Approach	Estimates value by discounting the future economic benefits or cash flows expected to be generated by the asset to their present value.	Present value of expected future cash flows generated by the asset.	Income-generating equipment, leased machinery, intellectual property, receivables, commercial assets.	Advantages: Captures the asset's income-generating capacity and investment value. Limitations: Requires reliable financial forecasts and appropriate discount rates, making results sensitive to assumptions.

As illustrated in Table 1, each valuation approach possesses specific strengths and limitations depending on the characteristics of the collateral asset. The market approach is generally considered the most reliable when sufficient market evidence exists, whereas the cost approach is particularly suitable for specialized industrial equipment with limited secondary markets. The income approach is primarily applied to income-generating assets capable of producing measurable future cash flows. In practice, professional valuers frequently combine two or more valuation approaches to improve valuation reliability and comply with the International Valuation Standards (IVSC, 2025).

From a legal perspective, movable asset valuation is closely connected with secured transaction laws, collateral registration systems, creditor rights, and insolvency legislation. The UNCITRAL Legislative Guide on Secured Transactions (2016) and the World Bank Principles for Effective Insolvency and Creditor/Debtor Regimes (2021) stress that effective collateral systems require [10, 13]:

- Legally enforceable security interests;
- Centralized electronic collateral registries;
- Transparent priority rules among creditors;
- Efficient enforcement procedures;
- Professional and independent valuation practices.

The Basel Committee on Banking Supervision (BCBS, 2024) further recommends that banks periodically reassess collateral values, especially for assets exposed to significant market volatility. Regular revaluation ensures that collateral coverage remains adequate throughout the loan term and contributes to maintaining financial stability [14].

With the rapid development of digital technologies, valuation practices have evolved considerably. Artificial intelligence (AI), big data analytics, blockchain-based collateral registries, and automated valuation models (AVMs) increasingly support the objective, consistent, and real-time valuation of movable assets. These innovations reduce operational costs, improve valuation accuracy, and accelerate lending decisions while strengthening overall credit risk management.

Beyond valuation methodologies, the effectiveness of movable asset financing largely depends on an appropriate legal and institutional framework. International experience indicates that legally enforceable security interests, transparent collateral registration systems, and efficient enforcement mechanisms significantly enhance lenders' confidence and facilitate access to secured credit. Consequently, legal infrastructure is regarded as an essential complement to professional valuation practice.

Consequently, the theoretical foundations of movable asset valuation integrate economic valuation principles, legal certainty, financial risk management, and technological innovation, making valuation an indispensable element of modern secured lending systems.

The valuation of movable assets has become an essential component of modern secured lending systems, enabling financial institutions to assess collateral value accurately and manage credit risk effectively. As businesses increasingly rely on movable assets—such as machinery, equipment, vehicles, inventories, and receivables—to secure financing, reliable valuation practices have gained strategic importance for both lenders and borrowers. Accurate valuation not only determines the amount of credit that can be extended but also enhances financial stability by reducing the risk of overvaluation or undervaluation of pledged assets.

International experience demonstrates that the countries examined have established comprehensive legal frameworks, professional valuation institutions, and electronic collateral registry systems to ensure transparency and efficiency in secured transactions. While the core objective of movable asset valuation is similar across countries, significant differences exist in legal regulations, valuation methodologies, institutional arrangements, and collateral registration mechanisms. Examining these international practices provides valuable insights for improving national valuation systems and strengthening collateral-based lending frameworks.

Table 2

International Practices in the Valuation of Movable Assets for Loan Collateral Purposes [10–19]

Country	Legal Framework	Valuation Mechanism	Professional Valuation Institution	Collateral Registry	Advantages	Challenges
United States	Uniform Commercial Code (UCC) Article 9	Market, Cost, and Income Approaches (USPAP & IVS)	Appraisal Institute, American Society of Appraisers (ASA)	UCC-1 Financing Statement System	Efficient registration, strong creditor protection, developed secondary markets	Regulatory differences among states
United Kingdom	Companies Act 2006; Financial Services and Markets Act	RICS Red Book and IVS	Royal Institution of Chartered Surveyors (RICS)	Companies House	High professional standards and market transparency	High valuation costs

Germany	German Civil Code (BGB); Commercial Code (HGB)	IVS and European Valuation Standards (EVS)	HypZert, DIA	Security interest registration through financial institutions	Conservative risk assessment and financial stability	Strict lending requirements
Singapore	Companies Act; Personal Property Securities Framework	IVS-based valuation supported by digital platforms	Institute of Valuers and Appraisers Singapore (IVAS)	ACRA electronic registry	Highly digitalized and efficient registration system	Higher compliance costs for SMEs
China	Civil Code; Property Law	National valuation standards aligned with IVS	China Appraisal Society (CAS)	Credit Reference Center (PBOC)	Extensive digital infrastructure and government support	Limited market transparency in some sectors
Turkey	Banking Law No. 5411; Law No. 6750 on Movable Pledges	IVS and Turkish Valuation Standards	Turkish Appraisers Association (TDUB)	TARES (Movable Pledge Registry)	Facilitates SME access to finance	Limited liquidity of certain movable assets

Table 2 demonstrates that although countries differ in their legal traditions and institutional arrangements, they share several common features in the valuation of movable assets for secured lending. First, the countries examined generally rely on internationally recognized valuation principles, particularly the International Valuation Standards (IVS), to ensure consistency, transparency, and market-based valuation. Second, independent professional valuation organizations play a central role in maintaining valuation quality through certification, ethical standards, and continuous professional development. Third, the establishment of centralized electronic collateral registries can improve the legal certainty of secured transactions, reduce information asymmetry, and support more efficient enforcement procedures. Finally, digital technologies, including electronic registration systems, automated valuation models, artificial intelligence, and big data analytics, are increasingly integrated into valuation practices to improve efficiency, reduce operational costs, and strengthen credit risk management. These international experiences indicate that an effective movable asset valuation system requires not only sound valuation methodologies but also strong legal institutions, professional expertise, and advanced digital infrastructure.

Despite significant progress in the valuation of movable assets, several challenges continue to limit the effectiveness of collateral-based lending systems. One of the major difficulties is the absence of active secondary markets for many categories of movable assets, particularly specialized industrial equipment and customized machinery. Limited market transactions reduce the availability of comparable market data, making it difficult for professional valuers to estimate fair market value accurately. Moreover, rapid technological obsolescence, depreciation, and fluctuations in market demand further complicate the valuation process and increase uncertainty in determining collateral value.

Another important challenge is the inconsistency of legal and institutional frameworks across countries. Although many jurisdictions have adopted secured transaction laws based on international best practices, differences in collateral registration procedures, enforcement mechanisms, and creditor protection continue to affect the reliability of movable asset financing. In some developing economies, gaps in electronic collateral registries, the limited availability of qualified professional valuers, and insufficient market transparency remain major barriers to the effective use of movable assets as loan collateral.

Recent technological developments have created additional opportunities to address these challenges. Artificial intelligence (AI) has emerged as one of the most promising innovations in asset valuation. AI-based valuation systems utilize machine learning algorithms to analyze large volumes of historical transaction data, market trends, depreciation patterns, and asset characteristics. By identifying complex relationships among multiple variables, AI-based systems may improve valuation accuracy while reducing the influence of subjective judgment and operational costs. Furthermore, AI can enable continuous monitoring of collateral values, allowing financial institutions to identify significant market changes and respond to emerging credit risks in a timely manner.

Another important innovation is the application of automated valuation models (AVMs). AVMs integrate statistical techniques, econometric models, and artificial intelligence to generate rapid and consistent estimates of asset values. Compared with traditional manual valuation methods, AVMs can reduce processing time

and improve consistency across valuation reports. Financial institutions increasingly employ AVMs for the preliminary assessment of standard movable assets, including motor vehicles, agricultural machinery, and commercial equipment, while complex or specialized assets continue to require professional expert appraisal.

The integration of big data analytics has also transformed valuation practices. Modern financial institutions collect information from multiple sources, including electronic collateral registries, insurance records, auction databases, maintenance histories, GPS tracking systems, and online trading platforms. The availability of these datasets can support more comprehensive market analysis, improve predictive accuracy, and enhance risk assessment throughout the lending process. As a result, big data analytics can support more objective valuation decisions and strengthen collateral management systems.

Blockchain technology represents another significant innovation in secured lending. Blockchain-based collateral registries create immutable and transparent records of asset ownership, security interests, and transaction histories. Unlike conventional centralized databases, blockchain technology can enhance data integrity, reduce the risk of fraud, prevent the duplicate pledging of the same asset, and facilitate faster verification by lenders. Smart contracts built on blockchain platforms may further automate collateral registration, monitoring, and enforcement procedures, thereby reducing administrative costs and increasing legal certainty.

The increasing importance of environmental, social, and governance (ESG) principles has introduced a new dimension to asset valuation. Financial institutions are gradually incorporating ESG considerations into collateral assessment by evaluating environmental performance, energy efficiency, carbon emissions, sustainability standards, and climate-related risks associated with pledged assets. Assets that comply with higher ESG standards may demonstrate stronger long-term marketability and lower credit risk, particularly within sustainable finance and green lending initiatives.

At the same time, the continued development of digital lending platforms has contributed to changes in collateral evaluation processes. Digital lending platforms integrate electronic customer identification, online documentation, automated risk assessment, electronic collateral registration, and AI-supported valuation within a coordinated credit process. This digital transformation may help shorten loan approval times, reduce transaction costs, and improve access to finance for small and medium-sized enterprises by supporting faster and more consistent collateral evaluation.

Machine learning (ML) further enhances modern valuation methodologies by enabling the continuous improvement of predictive models. Unlike traditional statistical models, ML algorithms automatically learn from new market information and continuously refine valuation accuracy over time. These algorithms can identify hidden patterns affecting asset prices, forecast depreciation trends, estimate liquidation values, and optimize collateral monitoring throughout the life of a loan. Consequently, machine learning contributes to more dynamic, data-driven, and adaptive valuation systems.

Overall, the future development of movable asset valuation is expected to be driven by the integration of artificial intelligence, automated valuation models, blockchain technology, big data analytics, machine learning, and ESG-oriented assessment frameworks. The combination of these technological and institutional innovations may improve valuation accuracy, strengthen credit risk management, increase transparency, reduce operational costs, and promote more efficient collateral-based lending systems. As financial markets continue to digitalize, these innovations may become increasingly important components of international valuation practice and modern secured transaction frameworks.

CONCLUSION AND SUGGESTIONS

The findings indicate that movable asset valuation has evolved into an essential component of modern secured lending systems and plays a critical role in strengthening financial stability and improving access to credit. International experience demonstrates that effective collateral valuation depends not only on the application of internationally recognized valuation methodologies but also on the existence of sound legal frameworks, professional valuation institutions, centralized electronic collateral registries, and efficient enforcement mechanisms.

The comparative analysis indicates that the countries examined have integrated International Valuation Standards into their national regulatory systems to varying degrees and are increasingly utilizing digital technologies to support valuation accuracy and operational efficiency. Innovations such as artificial intelligence, automated valuation models, blockchain technology, big data analytics, machine learning, and ESG-based assessment frameworks are contributing to changes in traditional valuation practices by reducing information asymmetry, enhancing transparency, and strengthening credit risk management.

The study concludes that countries seeking to improve collateral-based lending should prioritize the harmonization of valuation standards with international best practices, strengthen institutional capacity for professional valuation, modernize collateral registration systems, and accelerate the digital transformation of

valuation processes. Implementing these measures may contribute to more reliable movable asset valuation, broader financial inclusion, improved access to credit for small and medium-sized enterprises, and the sustainable development of financial markets.

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