# Research Hotspots and Frontier Analysis of Enterprise Data Asset Valuation

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**Abstract.** Based on 2,010 literatures related to enterprise data asset valuation from 2005 to 2025 in the Web of Science Core Collection, this paper employs the CiteSpace visualization analysis tool to reveal the development context, research hotspots and frontiers in this field. The findings indicate that the number of publications has increased significantly since 2020, reflecting a rapid rise in research enthusiasm driven by policies. The research field is highly concentrated in a main connected component with indirect correlations among themes, yet the network density is low, suggesting that the knowledge structure has not been highly integrated. Research hotspots focus on four themes: macroeconomics and cycles, corporate finance and performance, valuation methods and technologies, and external environment. Research frontiers center on the integration of management accounting and digital transformation. Future prospects for this field are proposed as follows:Promote innovation in valuation methods driven by digital technologies and interdisciplinary integration; Establish standards and security guarantee mechanisms for data asset valuation; Expand commercial application scenarios.

**Keywords:** Enterprise data asset; Asset valuation; Research hotspot; Knowledge map; CiteSpace

## 1 Introduction

Research in the field of data assets is advancing in tandem with the international academic shift in the definition of data,and public familiarity with data assets has increased markedly. In the era of the digital economy, research on data asset valuation is a timely and imperative endeavor.Nevertheless, most enterprises have not yet established a sound system for data assetization[1].Research on data asset valuation across the full life cycle suffers from several deficiencies: traditional cost approach, income approach and market approach have certain limitations in valuation methodologies; differentiated frameworks across industries have not been developed in practice; and digital technologies such as artificial intelligence and blockchain empower data processing and model optimization but are constrained by three major constraints:inadequate collaboration, lack of standards, and cost imbalance—requiring a breakthrough from the "technology island" effect. Amid the digital economy, the


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volume of collected data is growing exponentially, and the potential of data as a corporate asset has been recognized in principle[2]. Therefore, analyzing the research hotspots and frontiers of data asset valuation is of great significance. This paper conducts an in-depth investigation from the perspectives of annual publication volume, research hotspots and research frontiers, aiming to provide a reference for further studies in this field.

## 2 Research Methodology and Data Sources

### 2.1 Research Methodology

CiteSpace is a software tool for scientific bibliometrics and visualization, mainly used to analyze research trends, knowledge structures, hotspots and frontiers in academic literatures. This paper applies CiteSpace to explore the research hotspots and trends in the field of enterprise data assets through a series of analytical methods including publication trend analysis, keyword co-occurrence, keyword time-series analysis and keyword burst detection, in the forms of graphical representation and textual analysis.

### 2.2 Data Sources

All literature data used in this study are sourced from the Web of Science Core Collection. The retrieval period spans from January 1, 2005 to December 31, 2025. Literatures were screened with the topic "data asset", further refined by core terms "enterprise" and "business", yielding a total of 2,010 valid references after manual screening.

## 3 Bibliometric Analysis of Enterprise Data Asset Research

The annual variation in the number of publications directly reflects the development of a research field.It exhibited steady growth starting in 2005 and peaked at 367 papers in 2025，indicating a rapid development of relevant research in recent years with abundant achievements .Specifically, 2020–2025 marked a period of concentrated development for enterprise data asset valuation research, with a steady annual increase in publications. While the growth of early publications was relatively moderate, the number has shown a downward trend in recent years.

## 4 Hotspot and Frontier Analysis of Enterprise Data Asset Research

### 4.1 Keyword Co-occurrence Analysis

Keywords summarize and refine article content, enabling the identification of research hotspots, frontiers and internal correlations in a field. Using CiteSpace with the

time span 2005–2025 and node type set to "Keyword", a keyword co-occurrence map was generated. As shown in Figure 1, the keyword co-occurrence network contains 630 nodes (N) and 1,357 links (E), with a network density of 0.0068. The largest connected subgraph includes 586 nodes, accounting for 93% of all nodes, meaning research in this field is highly concentrated in a main connected component with extensive indirect correlations among themes. However, the low network density implies sparse co-occurrence relationships among keywords and an incompletely integrated knowledge structure.

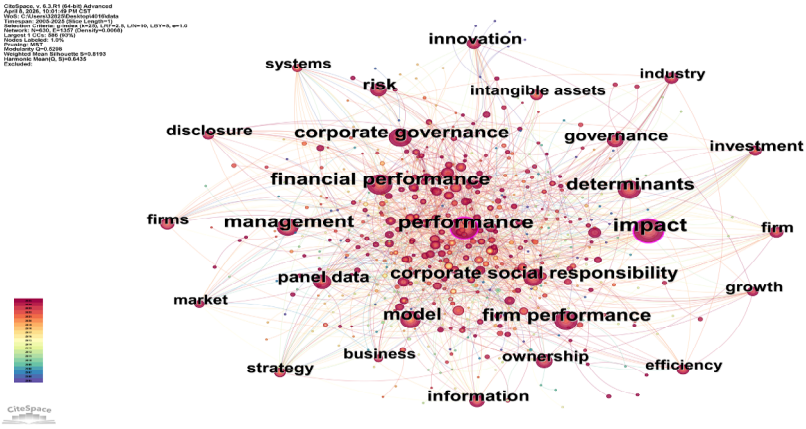


**Fig. 1.** Keyword Co-occurrence Network

Based on the distribution of high-frequency keywords, four core thematic clusters are summarized:

1. Asset attributes and value foundations: "intangible assets" serves as a core node, indicating that data assets are regarded as an extension or special category of intangible assets. The emergence of "value" and "model" reflects scholars' efforts to construct data asset valuation models for defining value composition and measurement paths.

2. Corporate performance and governance mechanisms: "performance", "firm performance" and "growth" form a set of corporate output dimensions, highlighting the impact of data assets on business performance as a core research focus. "Governance", "ownership" and "corporate social responsibility" explore the institutional foundation of data asset management from the perspectives of corporate governance and ownership structure.

3. Innovation and strategic management: "innovation" and "strategy" indicate that data asset valuation is not merely a financial accounting issue but embedded in corporate innovation and strategic decision-making[3]. Data asset-driven product innovation, process optimization and business model restructuring are key topics in this direction.

4. Risks and external environment: "risk", "determinants", "industry", "systems" and "information" point to sources of uncertainty, industry heterogeneity and information

system infrastructure in data asset valuation, which must consider both internal management risks and external market conditions.In summary, the keyword co-occurrence network presents a knowledge structure characterized by "intangible assets as the theoretical anchor, corporate performance as the core dependent variable, governance and innovation as moderating mechanisms, and panel data as the primary tool".

## 4.2 Keyword Clustering Analysis

Keyword clustering groups high-frequency keywords by similarity and co-occurrence to form thematic terms, visually displaying research hotspots in enterprise data asset valuation. Figure 2 shows moderate co-occurrence relationships among nodes. The clustering modularity Q = 0.5298 (> 0.3), indicating a significant clustering structure; the weighted average silhouette value S = 0.8193 (> 0.7), suggesting high homogeneity within each cluster and strong reliability of the clustering results.

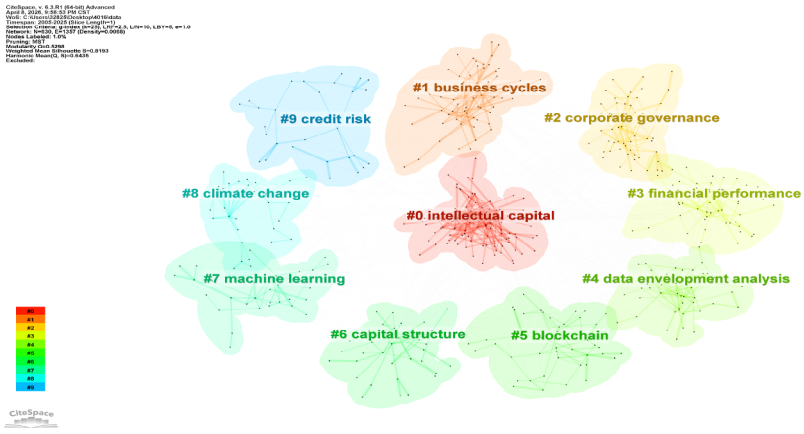


**Fig. 2.** Keyword Clustering Map

From clustering labels, nine clusters are formed and classified into four themes:

1. Macroeconomics and cycles: #1 business cycles, #2 corporate governance. These clusters reflect that data asset valuation is not an isolated technical issue but embedded in macroeconomic fluctuations and internal corporate governance frameworks. Studies show that the recognition, measurement and disclosure of data assets are significantly affected by economic upturns and downturns; meanwhile, board structure, internal control quality and information transparency directly determine whether data assets can be effectively integrated into the corporate valuation system.

2. Corporate finance and performance: #3 financial performance, #6 capital structure, #9 credit risk. The mechanism of data assets affecting corporate profitability, asset turnover and market value is a core focus. Additionally, the debt collateral function of data assets and its impact on corporate leverage and financing costs have become new growth points in capital structure research[4].

3. Valuation methods and technologies: #4 data envelopment analysis, #5 blockchain, #7 machine learning. Data envelopment analysis is widely used to measure the input-output efficiency of data assets; machine learning shows significant advantages in high-dimensional feature screening and unstructured data pricing; blockchain, as an underlying trust mechanism, solves problems of data asset traceability, right confirmation and transaction verification[5]. The three jointly form the technical triangle of data asset valuation methodology.

4. External environment: #8 climate change. Potential explanations include: corporate carbon data and environmental compliance data are emerging as important data asset categories; meanwhile, extreme climate events pose risks to the value stability of data infrastructure and data assets[6]. This cluster signals that "green data asset" valuation may become an interdisciplinary research direction.

### 4.3 Keyword Burst Detection Analysis

As shown in Figure 3, the keyword burst map contains 25 burst keywords with burst intensities ranging from 3.16 to 9.40. "Management and accounting" is the strongest burst term, indicating that the management and accounting perspective has become the most active research frontier in recent years, followed by "systems" and "internet", reflecting that information systems and internet technologies were once phased hotspots.

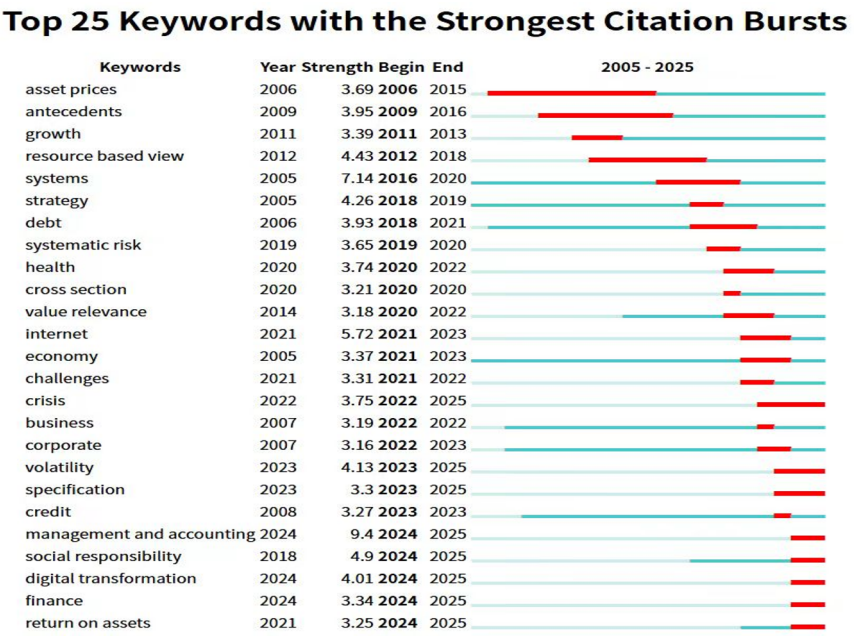


**Fig. 3.** Figure X Burst Detection Map

First stage(2005–2015): Burst terms include "asset prices", "antecedents", "resource based view" and "growth". Supported by the resource-based view, this early stage focused on the pricing logic and antecedent variables of data assets, with prominent theoretical construction characteristics.

Second stage (2016–2021): Burst terms such as "systems", "strategy", "debt", "systematic risk", "health", "value relevance", "internet", "economy" and "challenges" emerged intensively. Research perspectives expanded from single asset pricing to information system integration, debt financing correlation, systematic risk measurement and value relevance in the internet economy[7].

Third stage (2022–2025): Burst terms including "crisis", "volatility", "specification","management and accounting", "social responsibility", "digital transformation", "finance" and "return on assets" appeared successively. On the one hand, digital transformation research emphasizes the value creation potential of data assets to enhance corporate performance through data-driven decision optimization, personalized marketing and product innovation[8]. On the other hand, social responsibility research introduces normative constraints such as data ethics, privacy protection and algorithmic fairness. The intensive introduction of regulatory frameworks such as the EU General Data Protection Regulation, China's Data Security Law and Personal Information Protection Law has made data asset value realization no longer a purely technical or economic issue but a governance issue embedded in social contracts.Research on data asset valuation has evolved along the path of "theoretical construction–technical expansion–governance deepening", with frontiers focusing on the integration of management accounting and digital transformation.

# 5 Conclusions and Prospects

## 5.1 Conclusions

Based on CiteSpace, this paper analyzes 2,010 relevant literatures on data asset valuation from the Web of Science Core Collection and draws the following conclusions: research enthusiasm has risen rapidly; the research network has low density with an incompletely integrated knowledge structure; research hotspots concentrate on four themes—macroeconomics and cycles, corporate finance and performance, valuation methods and technologies, and external environment; research frontiers focus on the integration of management accounting and digital transformation.

## 5.2 Prospects

Combined with scholars' theoretical predictions and the practical status of enterprise data assets in the market, future research directions are proposed:

1. Promote digital technology-driven innovation in valuation methods and interdisciplinary integration.Against the backdrop of rapid development of the internet and AI, advanced technologies such as machine learning, deep learning and reinforcement learning should be introduced to construct intelligent valuation models for high-dimensional and large-scale data assets, significantly improving valuation accu-

racy, efficiency and automation, and effectively reducing enterprises' valuation costs and time. Such technologies are revolutionizing data asset valuation and will continuously drive the field toward deep integration of AI and big data. To achieve technology implementation and paradigm innovation, interdisciplinary integration and talent training must be strengthened: promote collaborative research between economics and data science to analyze the economic attributes of data assets and develop practical valuation theories and methods; facilitate the integration of law and technology to embed compliance requirements into technical design and ensure legal, secure and credible valuation; accelerate the construction of a compound talent system by optimizing curriculum design, research orientation and internship practice in universities to cultivate a new generation of valuation professionals proficient in digital technologies and industry standards.

2. Develop standards and security guarantee mechanisms for data asset valuation.Research on standards and security guarantee mechanisms for data asset valuation should evolve toward "standardization, collaboration and intelligence". In terms of standards, break through the traditional intangible asset measurement framework and form a classified valuation standard system considering the non-rivalry and context-dependent value characteristics of data. In terms of security, integrate technical governance and institutional regulation, and build a full life cycle security barrier through zero-trust architecture, privacy computing and data compliance auditing, shifting standard and security construction from "parallel research" to "collaborative design".

3. Expand commercial application scenarios.Conduct research on scenario-adaptive expansion of data assets. Focus on developing a multi-dimensional quality indicator system incorporating emerging dimensions such as interpretability, semantic alignment and privacy protection in multi-modal, generative and federated data environments. Promote the evolution of valuation models toward dynamic intelligence by introducing adaptive weight adjustment, real-time anomaly detection and online service deployment to enhance responsiveness to real circulation environments. Integrate organizational and institutional variables to construct a more explanatory causal analysis framework. Through these paths, the practical application of data assets will transition from static expert valuation to scenario-adaptive and intelligently collaborative governance tools, better supporting a sustainable and trusted data circulation ecosystem.

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