



Can fintech drive innovation in enterprise digital business models?

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ARTICLE INFO

Keywords:

Fintech

Digital business models

Financing constraints

ABSTRACT

Using data from 2011 to 2023, this study explores the impact of enterprises' fintech development on digital business models (DBMs). This study reveals that fintech improves business models by addressing financing constraints and eliminating information asymmetry. These insights contribute to understanding fintech's micro-level behaviors and offer practical guidance for enterprises seeking to navigate the digital transition. Findings underscore fintech's significant role in supporting the adoption of DBMs.

1. Introduction

In the digital age, digital innovation, focusing on digital technology, is an emerging concept revolutionizing the economic system to foster innovative development. Digital innovation encompasses the amalgamation of digital technology with the tangible elements of a product during the innovation process (Zheng, 2025), which includes the introduction of new products, improvements in production methodologies, and changes in business models, challenging the foundational premises of various traditional innovation theories (Choudhary et al., 2025). Research about the determinants of corporate digital innovation predominantly emphasizes three facets, namely, digital strategy, resources, and innovation capabilities (Cumming et al., 2023; Qi et al., 2024). Regarding digital strategy, current literature posits that enterprises must develop a digital strategy guided by external digital development trends when initiating digital innovation (Awais et al., 2023; Lu et al., 2024; Tang et al., 2025). This study uses text analysis to gather patent abstract data from Chinese publicly traded firms to identify digital innovation. This study identified that governmental digital initiatives can affect corporate digital innovation through management's digital focus (Sjödin et al., 2023; Ul-Durar et al., 2025; Xie and Zhu, 2022). To enable digital innovation, firms rely on external digital infrastructure and platforms and internal human capital related to digital technology (Ciacci et al., 2024). According to current studies, digital mergers and acquisitions allow firms to develop a digital knowledge base during the industrial era, supporting digital innovation (Aboalsamh et al., 2023; Shi and Yang, 2025). Regarding digital innovation competencies, the existing literature posits that digital innovation competencies include the ability to survey the digital landscape for innovation opportunities (Qiao, 2025); aptitude to recognize, assimilate, and apply digital technological knowledge (Dong and Yu, 2023); and proficiency to reorganize, integrate, and transform existing and novel resources (Climent et al., 2024; De Nicola et al., 2024). Moreover, research has focused on industry position, digital innovation culture, and user feedback variables (Kou & Lu (2025)). However, no study exists on digital business models (DBMs).

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<https://doi.org/10.1016/j.frl.2025.107237>

Received 8 November 2024; Received in revised form 14 March 2025; Accepted 17 March 2025

Available online 17 March 2025

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This study explores the factors that drive DBMs, thoroughly examining the significant impact that fintech adoption by businesses has had on these models between 2011 and 2023. Furthermore, this study examines the relationship between technological advancements in finance and the development of digital strategies to identify the primary factors driving the transition from traditional business models to more agile, data-driven frameworks, underscoring the dynamic factor of modern commerce in the digital era (Chen and Shen, 2024; Le-Dain et al., 2023). This study stands out from the current literature by making two significant marginal contributions. First, it improves our understanding of the economic ramifications of enterprises' fintech initiatives. Although earlier studies have explored the benefits of fintech in various scenarios (Ding et al., 2025; Ma et al., 2025; Wu et al., 2025), this article explores the specific economic impacts that fintech has on enterprises, providing a more nuanced and thorough analysis. This provides valuable insights for policymakers, practitioners, and scholars alike. Second, this study presents a new approach for enterprises developing DBMs. In an era where digital transformation is critical to business success (Song et al., 2025; Yu and Shao, 2024), this study offers a roadmap for enterprises to leverage fintech to improve their digital skills and compete in the market (Mishra et al., 2024; Xu et al., 2024). By identifying the important features and methods required for effective DBM development, this study provides enterprises with the information and resources they need to succeed in the digital age. Overall, these contributions reflect this study's commitment to advancing fintech and DBM development and its ability to inform and guide future research and practice in this area.

2. Research methodology

2.1. Empirical method

This research employs a two-way fixed model as a methodology framework to investigate the causal relationship between fintech and enterprises' DBM innovation. Using this robust analytical methodology, the study aims to uncover the intricate dynamics at play between improvements in financial technology and the transformative effects they have on how businesses function and innovate in the digital realm.

$$DBM_{it} = \alpha + \beta \cdot fintech_{it} + \sum \gamma \cdot X + year_t + firm_i + \varepsilon_{it} \quad (1)$$

$$M_{it} = \alpha + \beta \cdot fintech_{it} + \sum \gamma \cdot X + year_t + firm_i + \varepsilon_{it} \quad (2)$$

$$DBM_{it} = \alpha + \beta \cdot fintech_{it} + \vartheta \cdot M_{it} + \sum \gamma \cdot X + year_t + firm_i + \varepsilon_{it} \quad (3)$$

2.2. Variable definitions

2.2.1. Measurement enterprises' Fintech

Current studies identify three primary methodologies for determining the level of fintech development: The China Digital Inclusive Finance Index, developed by the Digital Finance Research Center of Peking University, utilizes Ant Financial transaction data to assess fintech development across three dimensions: coverage breadth, utilization depth, and digitalization extent. The number of regional fintech enterprises reflects the level of regional fintech development. Third, text mining is used to determine the level of fintech development using keyword search results relevant to fintech. The first two assessment methods are mostly used for macroscopic study at national, provincial, and municipal levels, whereas the fintech index, which was developed using text mining, is more suited for microanalysis of firms. This article uses machine learning from commercial banks' annual reports to extract the frequency of 124 fintech terms across six domains, including artificial intelligence, blockchain, cloud computing, big data, internet, and mobile. The results are then logarithmically processed to determine enterprises' fintech development level (*fintech*).

2.2.2. Measurement enterprises' digital business models

This paper uses text analysis and machine learning approaches to evaluate listed companies' DBMs by examining the terminology in their annual reports, representing their developmental status and business philosophy. The precise measurement procedures are as follows. First, we determine the following seed word set by examining the DBM statements in the company's annual report—digital, electronic, networked, information-centric, cloud services, cloud infrastructure, big data, data repositories, information assets, data platforms, business intelligence, cloud strategy, cloud applications, cloud architecture, cloud development, cloud migration, cloudification, platformization, service platforms, e-commerce, online marketing, Internet+, extensive data, user profiles, modernization, network platforms, triple play, virtualization, business models, online marketplaces, electronic transactions, Internet-based systems, and operational platforms. The seed word set will then be improved using machine learning approaches. This work utilizes machine learning approaches to increase the vocabulary of keywords, recognizing that a single concept can frequently be conveyed using multiple synonymous terms. The Word2vec neural network approach for comparable words is trained on large amounts of financial data. It finds the top 30 comparable keywords from each seed word group while removing duplicates and low-frequency terms. Finally, assess the extent to which firms use DBMs. This article calculates the ratio of DBM terminology to the total word count of the annual report and detects keywords related to digital innovation in corporate annual reports.

2.2.3. Mechanism variables

Corporate finance technology improvement reduces information asymmetry, mitigates external financing constraints for firms, and

increases their potential for digital innovation, thus boosting digital innovation within enterprises. Given the extended duration, high risk, and irreversibility of research, development, and innovation operations, adequate and continuous external financial backing is essential (Ferilli et al., 2024). Nonetheless, statistics on digital R&D and innovation projects partially indicate firms' future developmental trajectory and strategic stance (Zhang and Yu, 2024), making it a significant commercial secret (Foglia et al., 2024). Relevant details are typically undisclosed, exacerbating the knowledge asymmetry between firms and external investors and increasing enterprises' external funding constraints (Hasan et al., 2024). The advent of fintech can help firms overcome external financial constraints and stimulate digital innovation (Liao et al., 2024). Using digital technology in conjunction with fintech advancement may assist firms in communicating details regarding digital innovation activities to external investors, thus reducing information asymmetry.

2.2.4. Control variables

This study incorporates various control variables from the firm, industry, and regional perspectives. The firm-level factors include firm size, age, profitability, liability, and governance structure. The HHI index represents industrial competitiveness, which is one of the industry-level factors. Meanwhile, the regional GDP per capita is one of the regional-level factors. Table 1 describes the detailed definition.

2.3. Data sources

Due to data availability limits, this article uses A-share listed firms as the primary sample for analysis. Given A-share companies' significant presence and significance in the Chinese economy, this decision assures a robust and representative dataset. The raw data utilized in this study, which included a variety of financial, governance, and characteristic variables, was carefully sourced from the prestigious China Stock Market & Accounting Research Database (CSMAR). CSMAR is well-known for its vast coverage and high-quality data, making it an excellent resource for our research project. Using this extensive dataset, the study intends to give meaningful and empirically informed insights on the causal relationship between fintech and DBM innovation among A-share listed firms. Table 1 shows the final sample of 31,810 observations from 2011 to 2023.

3. Empirical results analysis

3.1. Baseline regression findings

Table 2 presents the benchmark regression findings. Columns (1)–(4) of the regression analysis show a thorough development incorporating various control variables. Column (1) depicts the baseline model without control variables, allowing for an initial assessment of the relationship under investigation. Subsequently, Columns (2)–(4) introduce control variables pertaining to firms' characteristics, financial performance, and governance, respectively. This gradual method enables a thorough analysis of potential confounding factors. Regarding the core parameter of interest, the calculated fintech coefficients are consistently positive and statistically significant at 1 % across all model configurations. This robust finding emphasizes that increased fintech usage positively promotes enterprises' DBM innovation. Specifically, the growth of fintech can cause enterprises to experience a 0.55 % increase in DBM innovation.

We observe intriguing findings regarding the control variables included in our study. Specifically, enterprises' governance structures have no discernible effects on their DBMs. This suggests that although governance procedures are important for overall corporate performance and accountability, they may not directly influence the adoption or advancement of digital strategy. Our results reveal that an excessive fixed asset ratio harms DBMs. This finding underscores the importance of maintaining a balanced asset portfolio, as an over-reliance on fixed assets may limit the agility and flexibility required to navigate the digital landscape successfully.

Table 1
Variables descriptive statistics.

Variable	Definition	Obs	Mean	Std.	Min	Max
<i>fintech</i>	Enterprises' fintech	31,810	3.277	1.426	0.000	7.363
<i>DBM</i>	Enterprises' digital business models	31,810	2.099	1.166	0.000	6.225
<i>SIZE</i>	Firms assets scale	31,810	22.325	1.326	20.008	26.389
<i>AGE</i>	Firms' age	31,810	2.191	0.851	0.000	3.526
<i>ROA</i>	Profitable capability	31,810	0.044	0.046	−0.085	0.196
<i>LEV</i>	Debts extent	31,810	0.418	0.199	0.055	0.864
<i>GROWTH</i>	Growth ability	31,810	0.338	0.856	−0.618	5.961
<i>CAPITAL</i>	Capital intensity	31,810	2.409	1.866	0.408	11.897
<i>SOE</i>	Enterprises' ownership	31,810	0.359	0.479	0.000	1.000
<i>IND</i>	Independent directors ratio	31,810	0.376	0.056	0.001	0.799
<i>TOP1</i>	Equity concentration	31,810	0.333	0.162	0.003	0.898
<i>HHI</i>	Industrial competitiveness	31,318	0.129	0.136	0.015	1.000
<i>pgdp</i>	Regional GDP per capita	26,396	11.475	0.497	8.773	12.456

Table 2
Baseline regression results.

	(1) DBM	(2) DBM	(3) DBM	(4) DBM
<i>fintech</i>	0.569*** (5.81)	0.556*** (5.41)	0.553*** (5.22)	0.553*** (5.22)
<i>SIZE</i>		0.071*** (8.42)	0.070*** (7.66)	0.076*** (7.66)
<i>AGE</i>		−0.024*** (−2.71)	−0.023** (−2.31)	−0.018** (−2.31)
<i>SOE</i>		0.109*** (5.11)	0.108*** (5.04)	0.095*** (3.89)
<i>LEV</i>			0.013 (0.23)	0.074 (1.20)
<i>GROWTH</i>			0.026*** (3.32)	0.026*** (3.32)
<i>CAPITAL</i>			−0.020*** (−3.84)	−0.020*** (−3.41)
<i>IND</i>			0.024 (0.17)	0.097 (0.61)
<i>TOP1</i>			0.086 (1.49)	0.068 (1.01)
<i>HHI</i>				−0.055** (−2.54)
<i>pgdp</i>				0.007 (4.01)
<i>constant</i>	0.235*** (7.48)	−1.286*** (−7.40)	−1.293*** (−6.46)	−1.242*** (−6.28)
<i>controls</i>	No	Yes	Yes	Yes
<i>FE</i>	Yes	Yes	Yes	Yes
<i>N</i>	31,810	31,810	31,809	25,946
<i>R</i> ²	0.609	0.616	0.616	0.619

Note: The t-values are in parentheses.

3.2. Robustness tests analysis

First, this study employs peer firms' fintech adoption as an instrumental variable. We must acknowledge that the companies under scrutiny operate within the same industry and timeframe as their peers, ensuring relevance and comparability. Conversely, fintech solutions produced by unrelated industries within the same year are unlikely to significantly affect the focal firms' decisions. This is consistent with the principle of homogeneity among instrumental factors. The Kleibergen–Paap rk LM statistic, which has a significance threshold of 1 %, exhibits statistical robustness. Furthermore, the Cragg–Donald Wald F-statistic outperforms the Stock–Yogo F-test's critical value for detecting weak instrumental factors at a 10 % significance level. Finally, this study finds that the evidence does not support the null hypothesis of weak instrumental factors, confirming the validity and reliability of our instrumental variable approach. Furthermore, the calculated coefficients are significantly positive at 1 %, in line with the baseline regression results.

Second, given the exceptional impact of the COVID-19 pandemic on global businesses in 2020, this article purposefully removes sample data from 2020 to 2022. This exclusion aims to isolate the pandemic's effects and focus on a more stable period for analysis. The results in Column (2) of Table 3 find that the calculated coefficients remain significantly positive at the 1 % level. This outcome

Table 3
Robustness tests analysis.

	(1) DBM	(2) DBM	(3) DBM	(4) DBM	(5) DBM
<i>fintech</i>	0.593*** (3.74)	0.523*** (8.78)	0.467*** (7.98)	0.527*** (5.61)	0.554*** (5.15)
<i>L.fintech</i>				0.043*** (4.63)	
<i>constant</i>	−1.007*** (−3.75)	−1.531*** (−4.43)	−2.058*** (−6.44)	−1.087*** (−3.24)	−1.294*** (−4.11)
<i>controls</i>	Yes	Yes	Yes	Yes	Yes
<i>Kleibergen–Paap rk LM</i>	2957.291***				
<i>Kleibergen–Paap rk Wald F</i>	3296.718***				
<i>FE</i>	Yes	Yes	Yes	Yes	Yes
<i>Firm-year FE</i>	NO	NO	YES	YES	YES
<i>N</i>	31,761	18,134	25,933	22,146	25,964
<i>R</i> ²	0.474	0.591	0.819	0.622	0.620

Note: The t-values are in parentheses.

confirms the robustness of our baseline regression findings and emphasizes the consistency of our results, even after accounting for the pandemic's unusual circumstances. Thus, eliminating the pandemic years improves our study's overall validity and reliability.

Third, this paper introduces firm-year fixed effects into the analysis to address any potential endogeneity issues caused by omitted variables. This change is critical for eliminating biases caused by time-invariant firm-specific characteristics or year-specific disruptions. According to the regression results in Column (3) of Table 3, the estimated coefficient remains substantially positive at the 1 % level. This observation strengthens the baseline regression results, demonstrating the durability of our conclusions even after accounting for potential endogeneity with firm-year fixed effects.

Fourth, because the effects of fintech policy are not immediately apparent, enterprises require time to adjust to changes in government policy. This study uses the one-period lagged period fintech to perform a re-estimation. Column 4 of Table 3 suggests that fintech growth can effectively stimulate DBM, regardless of present and one-period lagged effects.

Finally, this study uses balanced data from 2011 to 2023 to offset the bias resulting from firms' entrance and exit over time. Column (5) of Table 3 presents the results. The computed coefficients are still significantly positive at 1 %, thus supporting the baseline regression findings.

3.3. Mechanism tests

Table 4 summarizes the mechanism analysis. The funding constraints that enterprises encounter are reported in Columns (1) and (2). The estimated coefficients in Column (1) are noticeably negative at the 5 % significance level, demonstrating that the development of fintech has a moderating effect on these financial limitations. This research emphasizes fintech's important role in facilitating enterprise access to funding. Consequently, with sufficient capital support, enterprises are better positioned to engage in DBM innovations, as demonstrated by the estimated results in Column (2). This relationship demonstrates the interdependence of fintech, finance limitations, and the growth of digital transformation within enterprises.

Columns (3) and (4) of the analysis demonstrate the effects of fintech in reducing asymmetric information in the enterprise sector. The computed coefficients in Column (3) are significantly negative at the 1 % significance level, implying that fintech is critical in alleviating information asymmetries. This ability of fintech to bridge the information gap efficiently removes barriers to efficient information transmission among enterprises, allowing for the smooth flow of resources. Furthermore, the estimated coefficients in Column (4) are statistically significant at the 1 % level, demonstrating fintech's interference or impact on alleviating asymmetric information. This detailed analysis highlights fintech's disruptive potential for increasing transparency and fostering more efficient resource allocation within the enterprise ecosystem.

4. Conclusion

Using data from 2011 to 2023, this study investigates the impact of enterprises' fintech development on DBMs. Furthermore, this study reveals that fintech improves business models by resolving financial restrictions and eliminating information asymmetry. For enterprises looking to navigate the digital shift, these insights contribute to understanding fintech's micro-level behaviors and offer useful advice. The findings underscore fintech's significant role in supporting the adoption of DBMs.

Thus, enterprises are compelled to actively drive financial technology improvement, accelerating complete integration and improving structural reform of the financial supply side. This need stems from the need to harness the full potential of financial technology in driving business growth and sustainability. To achieve this, enterprises must increase their investment and use of financial technology, creating a new business model that seamlessly incorporates digitization, development of information and technology, and intelligence. This allows them to contribute to the structural reform of the financial supply side by implementing their own green and digital initiatives. This dual approach promotes green development while propelling enterprises to high-quality advancement. Integrating financial technology with green and digital transformations allows enterprises to optimize their operations, decrease costs, and improve efficiency, resulting in increased competitiveness and profitability. To be ahead of the ever-changing

Table 4
Mechanism test results.

	(1) SA	(2) DBM	(3) ASY	(4) DBM
<i>fintech</i>	−0.007** (−2.14)	0.554*** (5.33)	−0.011*** (−3.58)	0.548*** (5.39)
SA		−0.135*** (−3.07)		
ASY				−0.006** (−2.27)
<i>constant</i>	−5.254*** (12.55)	−2.001*** (−5.16)	1.487*** (3.08)	−1.232*** (−3.88)
<i>controls</i>	Yes	Yes	Yes	Yes
<i>FE</i>	Yes	Yes	Yes	Yes
<i>N</i>	25,964	25,946	25,946	25,946
<i>R</i> ²	0.412	0.620	0.185	0.619

Note: The t-values are in parentheses.

business landscape, enterprises must prioritize adopting and integrating financial technology.

As this study has limitations, it emphasizes the need for further research in this domain. One critical area for improvement is the measurement of metrics connected to DBMs. This is a fundamental prerequisite, considering that researchers in this field have encountered challenges in precisely measuring the scope and identifying the essence of DBMs. Similar to this study, most previous studies have primarily focused on analyzing digital technology and its rapid implementation while failing to consider the deep significance of the changes brought about by these advances. Notably, strategic speculation frequently occurs in textual analysis, which, despite extensive robustness testing, has lowered the amount of test samples. Consequently, a more comprehensive investigation into this topic is necessary, further exploring the complexities of DBMs and their implications for enterprises in the digital age.

Funding

This research was funded by National Social Science Fund of China, grant number 24JYA03974.

CRediT authorship contribution statement

Jiqing Liu: Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Resources, Project administration, Methodology, Funding acquisition, Conceptualization. **Xiaojing Lv:** Writing – original draft, Supervision, Resources, Project administration, Methodology, Conceptualization. **Gui Zhang:** Supervision, Project administration, Methodology, Investigation. **Meng Zhang:** Software, Project administration, Formal analysis, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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