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How does Fintech Drive the Growth of New Quality Productive Forces of Enterprises in China?

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ABSTRACT

Fintech has revolutionized financial service models, but can it effectively address enterprise financing challenges and provide critical support for technological innovation—a cornerstone of new quality productive forces? Leveraging data from A-share listed companies (2011–2023), this study constructs a regional fintech development index based on the distribution of fintech firms across China and evaluates its impact on enterprise-level productive forces. The findings demonstrate that fintech significantly fosters new productive forces, a conclusion robust to instrumental variables, Heckman two-stage analysis, and alternative variable tests. Mechanism analysis reveals three key channels: mitigating information asymmetry, alleviating collateral constraints, and enhancing market competition. Heterogeneity analysis further indicates that fintech's impact is more pronounced among private enterprises, high-tech industries, and firms in eastern regions. As China prioritizes the development of new productive forces, sustained fintech advancement, deeper "data empowerment," and targeted policy measures are essential to ensure finance effectively serves the real economy and underpins high-quality economic growth.

KEYWORDS

Fintech; New Quality Productive Forces of Enterprises; Science and Technology Innovation; High-quality Economic Growth

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1. Introduction

In September 2023, China introduced the innovative economic concept of "new quality productive forces," which redefines traditional productive forces. The Chinese government emphasized that new quality productive forces represent advanced forces where innovation plays a leading role in moving away from traditional economic growth models. These forces are characterized by high-tech, high-efficiency, and high-quality attributes, aligning with the new development concept. In January 2024, China highlighted that the development of new quality productive forces is essential for fostering high-quality growth. He underscored the importance of ongoing innovation to drive the accelerated development of these forces. By December 2024, the Central Economic Work Conference had identified "leading the development of new productive forces through technological innovation and establishing a modern industrial system" as one of nine key priorities for 2025. These continuous statements on new quality productive forces clarify their scientific essence and provide strategic guidance for China's high-quality development as it progresses toward national construction and rejuvenation. Therefore, advancing new quality productive forces is a crucial step in building a new development pattern at this stage of growth, and a historic necessity for enhancing the socialist system with Chinese characteristics and establishing a high-level socialist market economy (Meng et al., 2023). However, the development of new productive forces in China still faces challenges such as dependence on Western countries for core technologies, macroeconomic governance issues, and the shifting global landscape (Xiong et al., 2023; Yang et al., 2024). Hence, identifying breakthroughs and exploring core strategies to accelerate the development of new quality productivity in China are of significant importance in the current context.

Enterprises, as key microeconomic entities, serve as the primary carriers of new quality productive forces. The advancement of social productive forces is reflected in the productivity improvements of enterprises (Bai et al., 2023). Within this framework, enterprises play a critical role in promoting technological innovation and driving productivity leaps, providing vital support for China's economic and employment resilience. The development of new quality productive forces is fundamentally about catalyzing enterprises' leapfrogging advancements in production modes, technology application, and efficiency through innovation, thereby driving a qualitative leap in the country's overall productivity (Qin et al., 2020). However, the inherent nature of enterprise innovation—such as high costs, uncertainty, and long cycles (Sun, 2024)—coupled with information asymmetries leading to issues like moral hazard and adverse selection (Berger et al., 1990), results in a natural reluctance from investment bodies to finance enterprises' technological innovation activities. This reluctance leads to significant financing constraints, stalling the progression of scientific and technological innovations and impeding further innovation. The challenge of enhancing enterprise productivity through new quality forces thus becomes more daunting.

In recent years, the integration of science and technology with finance, driven by big data, blockchain, cloud computing, and other emerging technologies, has led to the explosive growth of fintech. Fintech has created comprehensive digital footprints for enterprise operations and transactions, offering more precise forecasts for scientific innovation and reducing financial institutions' reluctance to lend for innovative projects. It has also provided more efficient and diversified financial products, addressing the financing challenges faced by enterprises engaged in scientific and technological innovation and the transformation of innovation results. Fintech is thus emerging as a potential breakthrough for advancing the development of new productive forces within enterprises. However, theoretical questions remain regarding its internal logic, specific mechanisms, and how fintech's role might differ based on enterprise characteristics. Many of these theoretical and practical issues are still under exploration.

To address these gaps, this paper focuses on microenterprises as its research subject. It constructs an index system for new quality productive forces at the enterprise level, based on the two-factor productivity theory, and empirically examines fintech's effect and internal mechanisms in fostering new quality productive forces. The

potential contributions of this paper are threefold: (1) New quality productive forces is an emerging concept, and there has been limited quantitative research at the microenterprise level. This paper enriches the theoretical understanding of this concept by building a new quality productive forces index system at the enterprise level, quantifying it in empirical analysis, and offering new perspectives and methodologies for researchers studying this phenomenon in China; (2) This paper integrates financial technology into the framework of new quality productive forces, exploring how the external environment influences these forces, thus expanding the research on new quality productive forces from a macro perspective; (3) The paper examines the heterogeneous impact of fintech on new quality productive forces from the enterprise, industry, and regional dimensions, providing more accurate policy recommendations for leveraging fintech to enhance new quality productive forces in enterprises.

2. Literature Review

2.1. The definition of fintech

Fintech is a technology-driven financial innovation that reconstructs the products, models, and ecosystem of traditional financial services through emerging information technologies such as big data, blockchain, and artificial intelligence. Fintech has promoted the popularization of convenient mobile payments, enhancing payment efficiency and the user experience. This rapid development has made it easier to implement accessible financial services. For example, mobile money has become increasingly popular worldwide, especially in places where traditional banking services are scarce (Pelletier et al., 2020). In some African countries, the mobile payment platform M-Pesa has enabled a large number of people without bank accounts to participate in financial activities. Fintech has a wide and diverse range of feasible applications in different economies. In developing countries, mobile payment technology has significantly improved the financial accessibility of low-income groups by simplifying transaction processes. Alipay and WeChat Pay have become popular in China and are the main payment methods for daily consumption (Claudel and Helena, 2020). In advanced economies, artificial intelligence-driven credit scoring models (such as Upstart) have lowered the financing threshold for small and micro enterprises through non-traditional data (such as educational background and social media behavior) (Fuster et al., 2021).

However, the global dissemination of fintech confronts significant heterogeneous challenges. In low-income economies, the weak network infrastructure and data security risks, such as the mobile payment fraud issues in Africa, have restricted the popularization of the technology (Munyegera and Matsumoto, 2016). In a high-interest-rate environment, for example, in Argentina and Turkey, the cost of technology adoption for small and medium-sized enterprises may be further intensified due to financing constraints (Beck et al., 2018). Moreover, the emergence of generative artificial intelligence，such as ChatGPT) is reshaping the boundaries of financial services (Lam, 2025). Nevertheless, its potential risks, such as algorithmic bias and regulatory arbitrage, urgently call for policy responses. These challenges require that the development of fintech must strike a dynamic balance between incentivizing innovation and managing risks.

2.2. Research on the impact effect of fintech

The rapid advancement of information technology has spurred financial innovation (Goldstein et al., 2019). As a key future trend in the financial industry, fintech encompasses the use of emerging technologies such as blockchain, artificial intelligence, big data, and cloud computing within the financial sector. This has significantly transformed the mode, efficiency, and accessibility of traditional financial services. Numerous scholars have examined the impact of fintech on commercial banks, businesses, and information security, among other areas. In the context of commercial banks, innovations in internet technology help reduce the information asymmetry

between banks and borrowers, enhance the operational efficiency of the financial system, and improve bank risk management (Lapavitsas et al., 2008; Srivastava and Abhinna, 2014). Fintech, by utilizing emerging technologies, reduces the non-performing deposit rate of commercial banks, thus lowering the risk-taking associated with bank assets (Pierri et al., 2020). Moreover, fintech accelerates the digital transformation of commercial banks through technologies like big data and blockchain, helping to mitigate asset risk-taking and credit risk (Bai et al., 2021). However, some literature presents an opposing view, suggesting that fintech increases the costs on the liability side for banks. In pursuit of higher returns, banks may opt for riskier assets, thereby raising the level of asset risk-taking (Bai and Zhang, 2024). Other scholars argue that the relationship between fintech and bank risk-taking is U-shaped: at low levels of fintech adoption, it reduces bank risk-taking by lowering overhead costs, but as fintech advances, it may lead to increased risk-taking due to higher capital costs (Bai and Harith, 2023).

Research on fintech's impact on enterprises largely focuses on the supply of credit, with an emphasis on fintech's role in reducing the chances of misclassifying a good company as a bad one, thus narrowing the financing gap (Lee et al., 2019). From the perspective of information collection, fintech enables real-time monitoring and inference of lenders' credit information through big data technology (Bazarbash and Majid, 2019). Additionally, fintech-powered information platforms facilitate cross-sector information sharing and ensure the reliability and security of data collection (Warren et al., 2015). On the information processing side, fintech introduces standardized information methods for settlement, improving the matching process between enterprises and investors (Bollaert et al., 2021). It also helps lending institutions develop enterprise credit assessment models, enhances the processing of risk information, and reduces the costs associated with risk assessments (Livshits et al., 2016). However, in the realm of information security, existing literature highlights concerns about the exposure of sensitive data during fintech data collection, particularly when converting "soft" information into "hard" data. There are ongoing risks related to information loss and privacy breaches (Liberti et al., 2019). Additionally, while an abundance of "hard" data is available, its trustworthiness is increasingly difficult to verify, which may prevent a proper understanding of borrowers' motivations (Jakšič et al., 2019). Furthermore, fintech relies on non-traditional credit assessment methods, and there is insufficient evidence to confirm the effectiveness of these methods in managing default risk (Di Lorenzo and Vincent, 2018).

2.3. Research on new quality productive forces

The existing literature on new quality productive forces is primarily divided into two main areas of focus: theoretical and empirical research. From a theoretical perspective, much of the discussion revolves around defining the concept and exploring its deeper implications. The new quality productive forces represent a significant leap in productivity. This form of productivity is driven by technological innovation, where the "new" refers to productivity generated through breakthroughs in key, disruptive technologies, and the "quality" highlights how these technological advancements drive stronger innovation and development (Bai et al., 2025). Building on this foundation, several scholars have expanded the concept. From a Marxist political economy viewpoint, new quality productive forces meet people's developmental and enjoyment needs in terms of results. They emphasize the quality of factors, promoting more complex combinations of productive elements. In terms of security, they depend heavily on the balance between government-market relations, stressing both stability and flexibility within the economic system (Bai et al., 2024). From a sociological perspective, new quality productive forces refer to the "new quality" of productivity suited to a higher stage of social development, offering greater potential than traditional productive forces (Bai et al., 2017). From a systems theory standpoint, they are seen as a "factor-structure-function" system, with interconnected and interacting productivity factors, structures, and functions (Zhou et al., 2022). In the context of historical materialism, new quality productive forces are seen as the productivity born from the new industrial technological revolution and its strategic emerging industries, essential for achieving high-quality

development in the new era (Tian et al., 2024). Based on these conceptual definitions, many scholars have also examined the conditions necessary for the formation of new quality productive forces and the practical pathways for their development. At the macro level, the creation of new quality productive forces relies on the institutional support of a new type of national system and technological breakthroughs, with the unified national market providing the foundation and the modernized industrial system serving as the industrial base for their rapid formation (Cai et al., 2022). At the level of productivity components, the development of new quality productive forces is driven by the continuous improvement of worker quality, the enhancement of labor tools, and the ongoing expansion of labor objects (Guo et al., 2024). Furthermore, the advancement of new quality productive forces requires the comprehensive involvement of systems, technology, industry, and talent (Du et al., 2023; Shi and Xu, 2024). In addition, the existing literature has explored how new quality productive forces contribute to the creation of a modernized industrial system, the promotion of common prosperity, and high-quality development (Ho et al., 2021).

Empirical research on new quality productive forces is less prevalent, with most studies using methods such as the entropy value method, entropy weight-TOPSIS, and projection tracing models to construct new quality productive forces at the regional level (Jiang et al., 2023). Some scholars have applied the entropy value method to assess new quality productive forces within specific industries, focusing on the external environment and resource allocation to explore practical strategies for the high-quality development of industries (Jiang et al., 2020). At the micro level, very few studies use the two-factor productivity theory to construct an index system for quantitatively measuring the level of new quality productive forces within enterprises, employing methods such as the entropy value approach (Kong et al., 2015).

2.4. Theoretical and Empirical review

Existing research on fintech has extensively explored its definition and its transformative influence on financial services. As a technology-driven innovation, fintech integrates big data, blockchain, and artificial intelligence to reshape traditional banking, enhance payment efficiency, and expand financial accessibility. Studies highlight its role in improving credit allocation, reducing information asymmetry, and accelerating the digitalization of financial institutions. However, the widespread adoption of fintech also presents challenges, including cybersecurity risks, regulatory uncertainties, and financial stability concerns. Addressing these issues requires a careful balance between encouraging innovation and implementing effective risk management strategies. A review of the existing literature reveals that scholars have made significant progress in studying new quality productive forces, particularly in defining the concept and exploring its connotations, characteristics, and role in high-quality economic development. These studies have provided valuable insights into the basic framework and essential features of new quality productive forces, highlighting their critical role in advancing economic development.

Empirical research on fintech and new quality productive forces has made progress using a variety of quantitative methods. Fintech research usually adopts text mining method and Peking University Digital Financial Inclusion Index to measure the development level of regional fintech in China. In addition, machine learning techniques are being applied to the large-scale data analyzed by fintech adoption. In contrast, the research on new quality productive forces mainly uses entropy value, entropy weight-TOPSIS, projection tracking model and other methods at the regional and industry level. Research at the micro level is limited, and the two-factor productivity framework is rarely used to assess firm-level productivity. While progress has been made in both areas, further integration of fintech metrics into new, high-quality productivity measures can improve understanding.

However, there are a few gaps that remain.

First, much of the research on new quality productive forces is primarily conceptual, with relatively limited quantitative analysis. The few quantitative studies that do exist tend to focus on regional and industry levels, with

scarce attention given to the micro-enterprise level. While macro-level data from regional and industry perspectives can reveal important trends, such studies often overlook the internal mechanisms and heterogeneity within individual firms. This limits a more nuanced understanding of how new quality productive forces function at the micro level.

Second, existing research tends to treat fintech and new quality productive forces as two independent domains, without systematically analyzing the interactions and influence mechanisms between the two. Given the evolving social and economic context of the new era, understanding the relationship between fintech and the new productive forces of enterprises is of great theoretical importance. It also holds practical significance for accelerating the development of new productive forces and promoting the high-quality development of the economy.

3. Theoretical analysis and research hypotheses

With the rapid development of information technology, fintech has evolved from a traditional payment tool to an all-round financial service system covering a series of innovative technologies such as big data, artificial intelligence, blockchain, etc., which has brought about a profound change in the economic structure and the market environment, greatly enhanced the universality and accessibility of financial services, and provided enterprises with a more convenient and diversified financing channel, thus providing necessary financial support and financing services for the key new quality productive forces factor of science and technology innovation. It has provided enterprises with more convenient and diversified financing channels, thus providing the necessary financial support and financing services for science and technology innovation, which is a key element of new quality productive forces. Fintech cultivates the new productive forces of enterprises mainly in three aspects: alleviating information asymmetry, collateral constraints and promoting market competition.

3.1. Fintech and New Quality Productive Forces of Enterprises

New quality productive forces is a productivity leap driven by innovation. The improvement of new quality productive forces of enterprises cannot be separated from their science and technology innovation activities. As a key driver of innovation in the financial industry, fintech has improved traditional financial activities (Schueffel and Patrick, 2016). The development of fintech has changed the relationship between traditional financial institutions and enterprises, fostering the cultivation and advancement of new quality productive forces of enterprises. Firstly, in terms of the financing process, fintech has transformed the operational model and service efficiency of the financial industry (Philippon and Thomas, 2016). Traditional loan processes usually involve complex approval procedures, cumbersome paperwork, and long processing times, which not only increase the financing costs for enterprises but also delay the flow of funds. With the application of fintech technologies such as big data, cloud computing, and blockchain, financial institutions can accelerate loan approval processes and reduce loan assessment costs through algorithms and intelligent means (Bollaert et al., 2021). For instance, Fuster et al. (2019) found that the use of fintech has increased the speed of loan approval by 20% compared to traditional methods, and this faster processing speed does not come at the cost of higher default rates. Secondly, in terms of financing thresholds, the development of fintech has promoted the popularization of financing. Traditional financial institutions usually rely on traditional assessment methods such as an enterprise's credit history and asset guarantees, which makes it difficult for many emerging enterprises or those with short credit records to obtain financing (Lv, 2015). However, fintech, through technologies such as big data analysis, machine learning, and artificial intelligence, can more comprehensively assess the credit status and potential risks of enterprises, thereby reducing financing costs and expanding the scope of financial services (Demertzis et al., 2018). Finally, in terms of financing channels, fintech has broadened the financing avenues for enterprises, providing them and consumers

with an alternative source of funds and potentially improving the access to credit for under-served market segments (Claessens et al., 2018). Buchak et al. (2018) found that shadow banks based on fintech have a smaller loan burden compared to traditional banks, meaning that groups that have difficulty obtaining loans from traditional financial institutions are more likely to obtain funds from fintech shadow banks, providing new financing possibilities for investors. Therefore, the integration of finance and technology is bound to enhance the service efficiency and quality of finance, thereby providing more abundant funds for enterprise technological innovation and enabling enterprises to carry out a series of technological innovation activities, ultimately enhancing the new quality productive forces of enterprises. In view of this, this paper proposes:

Hypothesis 1: Fintech can cultivate new quality productive forces of enterprises.

3.2. The mediating role of information asymmetry

The theory of information asymmetry posits that the distribution of relevant transaction information among different stakeholders in the capital market is uneven. It is well-known that China's financial capital market mechanism is not yet fully developed, and bank credit remains a crucial channel for Chinese enterprises to obtain external financing. However, due to the issue of information asymmetry between banks and enterprises, firms face severe financing constraints (Allen et al., 2017). Existing research has indicated that Fintech can mitigate information asymmetry and enhance the efficiency of credit allocation (Song et al., 2021). This is because, on the one hand, Fintech can leverage machine learning and big data technologies to infer the credit quality of borrowers in real-time (Bazarbash and Majid, 2019). By utilizing existing networks and data, it can provide services at near-zero marginal cost, often without human intervention, to small suppliers. This approach avoids the human judgment inherent in traditional financial services, thereby reducing the impact of human bias and information asymmetry (Metcalfe and Bob., 2013). Additionally, the use of blockchain technology can establish a multi-departmental information-sharing platform that promotes transparency, immutability, traceability, and accountability of information. This mechanism not only facilitates the public sharing of financial data but also enhances information transparency, effectively addressing information asymmetry across different entities (Warren et al., 2015). On the other hand, Fintech can empower traditional banking services through digital technology, creating an information advantage (Frost et al., 2019). Lin et al. (2013), in their study of U.S. P2P lending data, found that borrowers' social network relationships serve as a signal of credit quality, which increases the likelihood of successful lending and reduces the probability of post-lending defaults. Björkegren et al. (2018) discovered that machine learning can capture customers' digital footprints to predict repayments and generate alternative scores, thereby compensating for the shortcomings of traditional credit scoring mechanisms and expanding the scope of credit information acquisition in terms of time and space. This demonstrates that Fintech plays a significant role in comprehensively mining customer information and alleviating information asymmetry. In view of this, this paper proposes:

Hypothesis 2: Fintech cultivates new quality productive forces of enterprises by alleviating information asymmetry.

3.3. The mediating role of collateral constraints

Bank credit is a significant source for enterprises to obtain stable and continuous external funding, which is also particularly important for firm innovation (Ma et al.， 2014). In imperfect market, asset mortgage can alleviate problems such as information asymmetry caused by incomplete credit contracts. Asset mortgage is widely used in loan contracts as an external option for creditors that reduces the incentive for debtors to default (Campello et al.,2012). The use of collateral can both reduce the pre-transaction adverse selection problem (Cerqueiro et al.,2016), and curb the post-transaction moral hazard problem (Berger et al.,2016). Chaney et al. (2012) uses data

on U.S. firms and finds that, in the presence of financing frictions, banks are more inclined to give loans to firms with collateral assets. As a new financial service model, fintech integrates multi-dimensional data information, analyzes the borrower's credit characteristics in a multi-dimensional and comprehensive way, and replaces the role of collateral in credit contracts with data (Huang and Qiu, 2021, which specifically includes social media data (US. Department of the Treasury, 2016; Jagtiani and Lemieux, 2018) and users' digital footprints (Berg et al.,2020). For large tech companies, data collection can also be extended to other aspects such as orders, transactions, and customer reviews (Frost et al.,2019). In addition, Gambacorta et al. (2024) point out that machine-learning based fintech credit scoring models are better at predicting borrower losses and defaults, and are able to monitor the data in real time, which can lead to timely adjustments in credit scoring through a study of transaction data from a Chinese fintech company. Jagtiani et al(2019) point out that fintech companies rely on big data, artificial intelligence and other technologies to carry out multi-dimensional data analysis of customers, so that some borrowers who are classified as subprime loans according to the traditional standards are categorised as a "better" grade of loans, which enables them to obtain lower-priced credit, This will enable them to access cheaper credit and provide science, technology and innovation financing for the development of new quality productive forces of enterprises through the study of the American lending company lendingclub. In addition, replacing collateral with data can avoid the problem of inefficient credit allocation caused by the decline in the value of collateral during the crisis (Wang et al.， 2024). In view of this, this paper proposes:

Hypothesis 3: Fintech cultivates new quality productive forces of enterprises by alleviating the reliance on collateral for debt covenants.

3.4. The mediating role of the degree of market competition

The birth of fintech brings a series of development opportunities and challenges to enterprises. In the face of the fierce competitive environment, enterprises urgently need to actively embrace fintech to improve their innovation ability in order to maintain their competitive advantage. And once this innovative behavior is long-term and breakthrough, it will substantially cultivate the development level of new quality productive forces of enterprises. Specifically, through the application of big data, machine learning and other technologies, fintech creates a new financial service model, significantly improves the efficiency of financial services, and expands the scope of financial service targets, thus promoting the inclusion of financial services (Gomber et al., 2017). The financing constraints of SMEs are also effectively alleviated by the development of fintech, which in turn promotes their innovative activities and enhances their market competitiveness (Wang et al., 2023). In addition, the intensified market competition brought about by fintech not only affects enterprises, but also has an important impact on the financial industry itself. Fintech disrupts the traditional value chain of financial institutions, redefining the boundaries of competitors and the competitive environment in the banking industry (Anagnostopoulos and Ioannis, 2018). The increase in the level of competition in the banking sector can stimulate financial innovation activities (Hu et al., 2016), thus providing the necessary financial support and financing services for science and technology innovation, which is a key new quality productive forces factor, and providing precise support for the development of new quality productive forces.

Theoretically, there are three main views on the impact of market competition on enterprise innovation: first, Schumpeter's hypothesis and later growth models based on creative destruction argue that market competition reduces enterprise innovation incentives by reducing monopoly rents; second, it is argued that there are more incentives in a competitive market than in a monopoly market, and that market competition incentivizes enterprise innovation (Blundell et al., 1999); and third, it is argued that market competition and firm innovation show an inverted U-shaped relationship that rises first and then falls, and there is an optimal level of competition in the market (Aghion et al., 2005; Bos et al., 2013). And given the special characteristics of the Chinese economy, the

degree of market competition is not as high as that of developed countries, far from reaching the optimal level of competition, there is a significant and robust positive relationship between competition and innovation (Zhang et al., 2014). In the fierce market competition, enterprises will generate the willingness and motivation to innovate and seek technological progress and product upgrading in order to expand their market share (Zucker et al., 2009). In addition, as the market plays a decisive role in resource allocation, market competition can optimize resource allocation, play the "survival of the fittest" mechanism to stimulate the innovation and development potential of enterprises (Li and Zheng, 2016), so that the allocation of resources in different industries and enterprises tends to optimize the allocation of resources, and contribute to the development of new quality productive forces of enterprises. In view of this, this paper proposes:

Hypothesis 4: Fintech cultivates new quality productive forces of enterprises by promoting market competition.

4. Research Design

4.1. Data Source and Data Processing

This paper selects Chinese A-share listed enterprises from 2011 to 2023 as the research sample. The enterprise-related financial and R&D data are obtained from the Cathay Pacific database (CSMAR) and WIND database, the enterprise-level fintech development index is obtained from the resultant number of relevant keywords obtained by analyzing the text of the annual reports of listed companies, and the data related to the characteristics of the city to which the enterprise belongs are obtained from the China Urban Statistical Yearbook. In order to make the sample data more representative, this paper treats the data as follows: (1) Excluding financial and real estate enterprises listed on the GEM; (2) Excluding ST and PT enterprises, and sample data of companies with more insolvency, stocks subject to special announcement by the CSRC, and with more missing main variables; (3) In order to prevent the interference of the outliers on the empirical results, all the selected continuous variables are subjected to a two-sided 1% shrinkage treatment. Finally, a total of 37,815 firm-year observations are obtained for the years 2011-2023.

4.2. Model Construction

Referring to Nanda et al (2013) and Zhang et al (2017), this paper constructs the following model to analyze the impact of the level of fintech on the new quality productive forces of enterprises:

$$Npro_{it} = \alpha + \beta Fintech_{it} + \Upsilon Controls + \delta_{it} + \varphi_{it} + \varepsilon_{it}$$

Where, the explanatory variable Npro denotes the level of new quality productive forces of firm i in year t. The core explanatory variable Fintech denotes the level of fintech development of prefecture-level city i in year t. Controls are other control variables that denote the individual characteristics of firms and affect the new quality productive forces of firms; δ denotes individual fixed effects; φ denotes year fixed effects; $\boldsymbol{\varepsilon}$ denotes the random error term; and the coefficient of the core explanatory variable Fintech, β, denotes the impact of fintech on the new quality productive forces of firms, and according to the hypothesis of this paper, the predicted coefficient β is significantly positive.

4.3. Measurement of key variables

4.3.1. Explained variable

The explained variable of this paper is new quality productive forces of enterprises (Npro). Currently there are

fewer quantitative measures for new quality productive forces of enterprises, this paper draws on the research ideas of Song (2024), constructs the new quality productive forces of enterprises index system based on the theory of two elements of productivity, and employs entropy value method to assign weights to each index. Specifically, productivity includes two elements: labor force and production tools. Among them, labor force consists of two sub-factors: live labor and materialized labor (labor object); production tools consist of two sub-factors: hard technology and soft technology. Considering the connotation of innovation in the new quality productivity, the indicators of the live labor subfactor are measured by the salary of R&D personnel, the percentage of R&D personnel, and the percentage of highly educated personnel, respectively; the indicators of the object labor subfactor are expressed by the percentage of fixed assets, respectively. Considering the fact that the enterprises of the new quality productivity are mainly concentrated in the high-precision science and technology field of equipment manufacturing, and that most of these enterprises have to rely on the production of high-end machines and instruments, and that the production of machines replaces human beings, the manufacturing costs of these enterprises have a higher manufacturing cost ratio than other enterprises, so the manufacturing cost ratio is also included in the indicator selection. Hard technology sub-factors are mainly related to R&D investment in hardware equipment, so they are measured by R&D direct investment ratio, depreciation and amortization ratio and lease expense ratio respectively, while considering the role of intangible assets such as software, so they are also measured by intangible assets ratio; soft technology sub-factors are mainly included in the total asset turnover and equity multiplier to measure, considering that the higher the equity multiplier is, the higher the financial risk of the enterprise is, and this indicator is a negative indicator, which is different from other indicators. negative indicator, inconsistent with other indicators, so the inverse of the equity multiplier is used to indicate that the higher the inverse, the lower the risk, indicating that the enterprise productivity level is better. Specific indicators are shown in Table 1:

Table 1. Indicators of new quality productive forces of enterprises.

Factors	Subfactor	Index	Index value	weight
Labor force	Living labor	Proportion of R&D staff salary	R&D expenses - Salaries/revenue	25
		Proportion of R&D personnel	Number of R&D personnel/employees	2
		The proportion of highly educated personnel	Bachelor degree or above/Number of employees	3
	Materialized labor	Proportion of fixed assets	Fixed assets/total assets	1
		Percentage of manufacturing expenses	(Subtotal cash outflow from operating activities + depreciation of fixed assets + intangible assets Amortization + Impairment reserve - Cash paid for goods purchased and services received - Disbursements Wages paid to and for employees)/(cash from operating activities Outflow subtotal + depreciation of fixed assets + amortization of intangible assets + impairment reserve)	1
Tools of production	Hard technology	R&D depreciation and amortization ratio	R&D expenses - Depreciation and amortization/operating income	24
		Proportion of R&D leasing costs	R&D expenses - Lease fees/operating income	14

		Proportion of direct investment in R&D	R&D expenses - Direct input/operating income	27
		Proportion of intangible assets	Intangible assets/total assets	1
	Soft technology	Turnover of total assets	Operating income/Average assets	1
		The inverse of the equity multiplier	Total owner's equity/assets	1
New quality productive forces				100

4.3.2. Core explanatory variable

The core explanatory variable of this paper is the level of financial technology development (Fintech). According to the definition of the Global Financial Stability Board (FSB), Fintech is a form of technology that incorporates finance and technology into financial services, and can enhance the efficiency of the traditional financial industry and effectively reduce operating costs through cloud computing, big data, blockchain, artificial intelligence and other emerging technologies. Based on this, this paper firstly searches the keywords "financial technology", "cloud computing", "big data", "blockchain", "artificial intelligence", "Internet of Things"etc. on the website of "TIANYANCHA" in order to obtain the industrial and commercial registration information of all the related companies. In order to avoid coincidental character matches in the search, this paper only retains the samples with the above keywords in the company name or business scope. In the end, the number of fintech companies in prefecture-level cities is counted each year, and the level of regional fintech development is measured in this way, with the larger value representing the higher level of fintech development.

4.4. Descriptive statistics

Table 2 reports the basic statistical characteristics of the main variables. The mean value of the explanatory variable, new quality productive forces of enterprises (Npro), is 5.0486, and the median is 4.71, which is slightly lower than the average level of Npro of A-share listed firms, indicating that there is a certain right skewed characteristic of Npro of listed firms; the standard deviation is 2.495, which indicates that the level of Npro among A-share listed firms during the sample period The standard deviation is 2.495, indicating that the level of new quality productive forces among A-share listed firms in the sample period is relatively large; the mean value of the core explanatory variable (Fintech) is 3.9684, with a large gap between the maximum value and the minimum value, reflecting that the level of regional Fintech in the sample period is uneven. Other control variables, such as the degree of dispersion and the level of variability, are basically consistent with existing studies. The results of the covariance test of each main variable show that the vif value is between 1.01 and 1.16, and the mean value is 1.09, indicating that the variables selected in this paper do not have covariance problems and fulfill the research conditions.

Table 2. Descriptive statistical results.

Var	N	Mean	SD	Min	Me	Max
Npro	37815	5.0486	2.495	0.65	4.71	14.64
Fintech	37815	3.9684	2.610	0.00	4.03	8.23
Der	37815	1.1636	1.446	0.04	0.72	9.53
Indep	37815	0.3766	0.053	0.33	0.36	0.56
Cashflow	37815	0.0453	0.068	-0.14	0.04	0.22
Fixed	37815	0.2078	0.157	0.00	0.18	0.66
Dual	37815	0.2789	0.448	0.00	0.00	1.00
ListAge	37815	2.1940	0.828	0.00	2.40	3.37
Growth	37815	0.1492	0.368	-0.52	0.09	1.83

5. Empirical Tests

5.1. Benchmark regression

Table 3 reports the results of the benchmark regression of Fintech on new quality productive forces. Among them, columns (1)-(2) are the regression results with only core explanatory variables and control variables added, and the regression coefficient of financial technology (Fintech) is significantly positive at the 1% level without adding fixed effects; considering that there may be variability in the process of developing new-quality productivity for different firms, this paper controls for individuals and time in columns (3)-(4); in column (4), for example, after adding fixed effects, the regression coefficient of Fintech is 0.1181. column, for example, after adding fixed effects, the regression coefficient of financial technology (Fintech) is 0.1181, which is significantly positive at the 1% level, which indicates that the development of Fintech significantly promotes the development of new quality productivity of enterprises, and Hypothesis 1 is proved.

Table 3. Baseline regression results.

Var	(1) *Npro*	(2) *Npro*	(3) *Npro*	(4) *Npro*
Fintech	0.1693***	0.2552***	0.0885***	0.1181***
	(3.8542)	(6.2451)	(3.7693)	(4.5804)
Der		-0.1225***		-0.0354***
		(-4.4734)		(-2.7961)
Indep		-0.0540		-0.6379**
		(-0.1111)		(-2.0868)
Cashflow		0.6728**		0.1299
		(2.1730)		(0.8316)
Fixed		5.7276***		7.9953***
		(23.1135)		(27.6474)
Dual		-0.0178		-0.0277
		(-0.2941)		(-0.8685)
ListAge		-0.1090		0.3312***
		(-1.6335)		(6.1185)
Growth		0.3160***		0.0866**
		(6.3563)		(2.5108)
Constant	4.3768***	3.1751***	4.6990***	2.4584***
	(40.7398)	(14.0556)	(50.5196)	(11.3959)
Firm	NO	NO	YES	YES
Year	NO	NO	YES	YES
N	37815	37815	37560	37560
Adj.R^2	0.031	0.162	0.719	0.777

*Note: *, **, and *** represent significance levels of 10%, 5%, and 1%; t-values of two-sided tests corresponding to robust standard errors of urban clustering are in parentheses. The following tables are identical.*

5.2. Endogenous treatment

5.2.1. Instrumental variable approach

Because of the potential impact of endogeneity problems such as possible omitted variables and reverse causality on the results of the empirical test, this paper refers to the relevant studies of Nunn et al (2014) and adopts the method of adding 1 to the reciprocal interaction term of the spherical distance from each prefecture-level city to Hangzhou and the number of Internet broadband access users and taking the natural logarithm, as an instrumental variable with the characteristics of time variation IV1. The main reason is that, on the one hand, the development of fintech represented by Ant Gold Service originated in Hangzhou, so Hangzhou is in a leading position in the development of fintech. In terms of realistic characteristics, the closer geographically to Hangzhou, the higher the level of fintech development. On the other hand, geographic distance does not change over time,

which invalidates the second-stage estimation of 2SLS with high probability. In addition, this paper also uses the core explanatory variable Fintech lagged by one period as an instrumental variable IV2. This design is based on the following reasons: on the one hand, the development of fintech has a certain time-lag effect, and its impact on new quality productivity of enterprises tends to appear gradually in the subsequent period. Therefore, lagging Fintech by one period can reduce the endogeneity problem to some extent. On the other hand, lagging Fintech by one period is less likely to have a direct correlation with the current error term, which helps to satisfy the condition that the instrumental variables are uncorrelated with the error term, thus improving the reliability and robustness of the estimation.

As can be seen from the results in columns (1) to (2) of Table 4, the regression coefficients of the core explanatory variable, Fintech, are still significantly positive at the 1% level after accounting for the endogeneity problem. Meanwhile, the Wald f-statistic of Kleiber gen-Paap rk is much larger than the critical value of Stock-Yogo's weak identification test at the 10% level, and passes the weak identification test; the P-value of Kleiber gen-Paap rk's LM-statistic is 0.0000, which rejects the original hypothesis of "insufficient identification of instrumental variables"; Hansen J-value is 0.210, which rejects the original hypothesis of "insufficient identification of instrumental variables"; the P-value of Hansen J-value is 0.3, which is the same as that of Stock-Yogo's weak identification test. 0.210, rejecting the original hypothesis of "over-identification of instrumental variables". The above tests prove the rationality of instrumental variable selection and the validity of the estimation results, which further support the conclusion that fintech has a significant positive impact on the new quality productivity of enterprises.

5.2.2. Heckman two-stage model

This paper may suffer from sample selection bias, specifically, since some firms may not have been directly affected by fintech or specific firms are not included in the sample due to data availability constraints, these omitted samples may be systematically different from the performance of the new quality productivity, thus introducing bias. Therefore, this paper corrects for this sample selection bias by referring to Puhani (2000) and using a Heckman two-stage model. First, in the first stage, a probit model is used to estimate the probability of whether a firm is affected by fintech or not by selecting variables including region, year, and industry dummy variables, thus calculating the Inverse Mills Ratio (IMR). Then, IMR is introduced as a control variable into the main regression equation in the second stage to correct the effect of selection bias on the regression results. The specific probit model is as follows:

$$Fintech_{it} = \eta_0 + \eta_1 Slection_{it} + \Psi_{it}$$

Where Fintech denotes the level of fintech development of a listed company in a given year. Selection is the Heckman first-stage selection variables, including time dummy (year_dummy), region dummy (province_dummy) and industry dummy (industry_dummy). The reason for the selection is that the region, year and industry factors may affect whether firms are facilitated by fintech, which leads to sample selection bias, but these factors have limited impact on new quality productive forces of enterprises, and thus comply with the identification restriction of the Heckman model.

The test results show that the estimated coefficients of the Inverse Mills Ratio (IMR) are statistically significant for Npro, indicating the existence of a distributional bias in new quality productive forces of enterprises. Therefore, it is necessary to test the effect of sample self-selection on the results of the benchmark regression. After adding IMR as a control variable in the second stage, the coefficient of the core explanatory variable Fintech remains significant at the 1% level and the direction is consistent with the results of the benchmark regression. The results of Heckman's two-stage model prove that the hypotheses of this paper continue to be valid after controlling for

selective bias and eliminating endogeneity to a certain extent.

5.2.3. Other robustness tests

Replacement of core explanatory variables. To further test the robustness of the empirical results, this paper refers to the research methods of Jagtiani et al (2017), combines the data availability of the Baidu search index, identifies the main keywords related to fintech (see Table 4), and collects all the Baidu search indexes for each of the keywords mentioned above, then aggregates them according to the various perspectives, and uses the entropy The entropy method is used to determine the weights, and multiple indices are synthesized into a comprehensive index, and the natural logarithm is finally taken. The regression results are shown in column (1) of Table 5, and the regression coefficients after replacing the core explanatory variables are still significantly positive at the 1% level.

Table 4. Fintech keywords.

Dimensionality	Fintech keywords
Basic technology	Big data, cloud computing, artificial intelligence, blockchain, biometrics.
Fund payment	Online payment, mobile payment, third-party payment.
Financial technology intermediary service model	Online lending, online financing, online financing, online small loans, online loans, online banking, Internet banking, online banking, open banking, Internet banking, direct banking.
A direct term for fintech	Internet finance, financial technology.

Replacement of explanatory variables. In this paper, we refer to Abdi et al (2010) and replace the new quality productivity of enterprises indicator system measured by principal component analysis for robustness test. When using principal component analysis, the KMO value is 0.746, and Bartlett's significance is 0.000, which indicates that the results of principal component analysis are more reasonable; secondly, the sum of the principal components is 77.17%, which indicates that the explanatory strength of the indicator construction is 77.17%, indicating that the new quality productivity indicator system of the enterprise constructed through the principal component analysis has high explanatory power, and the regression results are shown in Table 5, column (1). The regression results, as shown in column (1) of Table 5, indicate that the direction and significance of the role of financial technology (Fintech) on the new quality productivity of enterprises have not changed, indicating that the empirical results are robust; since the new quality productivity takes the significant increase in total factor productivity as the core symbol, this paper uses the total factor productivity of enterprises as a replacement explanatory variable to measure the level of new quality productivity of enterprises. In this paper, total factor productivity calculated by the OP method and LP method respectively is used as the replacement of the explanatory variables. Columns (3)-(4) of Table 5 show that the regression coefficients of the core explanatory variable (Fintech) are still significantly positive, which is consistent with the baseline regression results, i.e., the results of this paper are robust.

Table 5. Other robustness tests (1).

Var	(1) Replace the explanatory variable	(2)	(3) Replace the explained variable	(4)
	Npro	Score	TFP_OP	TFP_LP
Fintech2	17.9646***			
	(3.1726)			
Fintech		0.0045*	0.0370*	0.0540**
		(1.6990)	(1.9306)	(2.3773)
constant	2.4384***	0.0266	3.4014***	4.2077***
	(9.8802)	(1.3583)	(17.4217)	(17.2876)
Controls	YES	YES	YES	YES
Firm	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	37560	37560	37560	37560
Adj.R^2	0.778	0.808	0.552	0.565

Adjustment of sample and clustering method. Considering that municipalities directly under the central government have a higher level of fintech development, the new quality productivity level of enterprises develops faster. To avoid sample bias, this paper re-benchmarks the regression after removing the sample of municipalities directly under the central government. At the same time, considering the possible disturbing effect of the abnormal volatility of the Chinese stock market in 2015 on the development and investment behavior of enterprises, this paper further excludes the sample data in 2015 and re-estimates it. The regression results in columns (1)-(2) of Table 6 indicate that the conclusions of this paper still hold after adjusting the sample. In addition, this paper adjusts the clustering of the benchmark regression to the industry level to mitigate the industry to mitigate the endogeneity of the industry due to the external environment or internal differences. Column (3) of Table 6 shows that the regression coefficients of the core explanatory variables are still significantly positive after adjusting the clustering approach, i.e., the conclusions of this paper are robust.

Adding omitted variables. Considering the firm-level factors, to capture the potential impact of firm characteristics on the model results more comprehensively, this paper adds firm size (Size), firm leverage (Lev), return on equity (Roe), quick ratio (Quick), and liquid ratio (Liquid) as the omitted variables based on the original control variables. Column (4) of Table 6 shows that the regression coefficient of the core explanatory variable Fintech is still significantly positive at the 1% level after the addition of omitted variables, and the results of this paper are robust.

Table 6. Other robustness tests (2).

Var	(1) Exclude municipalities *Npro*	(2) Exclude year 2015 *Npro*	(3) Clustering industry *Npro*	(4) Add missing variables *Npro*
Fintech	0.1054***	0.1172***	0.1181***	0.1028***
	(4.2572)	(4.5096)	(3.0854)	(4.0404)
Constant	2.4334***	2.4228***	2.4584***	-1.2201
	(10.4126)	(10.5748)	(9.8716)	(-1.2898)
Controls	YES	YES	YES	YES
Firm	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	30329	35123	37560	37560
Adj.R^2	0.774	0.777	0.777	0.781

6. Further analysis

6.1. Mechanism analysis

6.1.1. Information asymmetry

Serious information asymmetry is one of the main reasons for enterprise financing constraints. Fintech utilizes big data, artificial intelligence, and other technologies to "empower" traditional financial institutions, mining more comprehensive user information and reducing the information asymmetry between banks and enterprises (Huang et al., 2018). In this paper, we refer to Amihud et al. (2002), and Pastor and Stambaugh (2003) to construct a proxy indicator for information asymmetry based on the literature on the microstructure of the financial market and the detailed trading data of individual stocks, i.e., we extract the first principal component of the liquidity ratio, the illiquidity ratio, and the inversion indicator as a proxy for the information asymmetry, which is denoted as ASY, and the higher the value of the indicator, the more serious the information asymmetry is. The larger the value of this indicator, the more serious the information asymmetry. The mediation effect model and Sobel test are used to verify whether Fintech can improve the new quality productivity of enterprises by alleviating information asymmetry. The

regression results in column (1) of Table 7 show that the coefficient of the core explanatory variable Fintech is significantly negative at the 1% level, and the Sobel statistic is also significant, which verifies that fintech cultivates the new productivity of enterprises by alleviating the problem of information asymmetry, and Hypothesis 2 is proved.

6.1.2. Collateral constraint mechanism

Asset collateral, as an external guarantee mechanism, can reduce financial friction and alleviate agency conflict between banks and enterprises. Asset collateralization ability is an important factor in whether firms can obtain bank loans, which plays an important role in the credit contract (Campello et al., 2012). In this paper, we refer to Almeida et al.'s (2007) model for calculating asset collaterability, which defines collateralizable assets as Define asset collaterability as money funds/total assets + 0.715 × (accounts receivable/total assets) + 0.547 × (inventory/total assets) + 0.535 × (fixed assets/total assets) to calculate collateralized asset Collateral for listed firms. The regression results in column (2) of Table 7 show that the coefficient of the core explanatory variable Fintech is significantly negative at the 1% level and the Sobel test passes, verifying that fintech cultivates the new quality productivity of enterprises by alleviating the reliance on collateral for debt covenants, and that Hypothesis 3 is confirmed.

6.1.3. Degree of market competition

Based on the theoretical analysis above, fintech changes the financial market pattern. The intensification of market competition will force enterprises to carry out science and technology innovation activities to realize technological progress and industrial upgrading, to develop the new quality productivity of enterprises. This paper adopts the Herfindahl Index (HHI) to measure the degree of market competition. The smaller the value, the more competitive the market is. Column (3) of Table 7 shows that the coefficient of the core explanatory variable Fintech is significantly negative and the Sobel test is passed, which verifies that fintech cultivates the new quality productivity of enterprises by promoting market competition, and Hypothesis 4 is proved.

Table 7. Mechanism test.

	(1) ASY	(2) Collateral	(3) HHI
Fintech	-0.0141***	-0.0081***	-0.0018*
	(-2.6840)	(-3.8644)	(-1.8854)
Constant	0.1430***	0.6226***	0.1196***
	(3.8167)	(39.8563)	(17.9059)
Sobel Z	19.46	4.667	4.952
Controls	YES	YES	YES
Firm	YES	YES	YES
Year	YES	YES	YES
N	37560	37560	37560
Adj.R^2	0.692	0.576	0.729

6.2. Heterogeneity analysis

6.2.1. Differences in the nature of property rights

First of all, this paper analyzes from the perspective of differences in the nature of enterprise property rights. Given the differences between state-owned enterprises and non-state-owned enterprises in terms of governance, policy support and other aspects, the relationship between fintech and new quality productive forces of enterprises may differ among enterprises with different ownership. On the one hand, SOEs are supported and protected by

government credit and face lower financial risks and financing pressures. On the other hand, a large number of studies have shown that compared with SOEs, private firms face more serious credit discrimination, and the long-standing property rights mismatch problem seriously reduces the allocation efficiency of resources. In order to test the above speculation, this paper is divided into state-owned enterprises and private enterprises according to the ownership characteristics of the enterprises, and the regression results are shown in column (1) of Table 8, the regression coefficient of Fintech on private enterprises is significantly positive at 1% level, which indicates that the effect of Fintech on the cultivation of the new quality productive forces of enterprises is greater in the private enterprises compared to the state-owned enterprises, which is probably due to the following reasons: on the one hand, private enterprises have relatively limited financing channels and usually face higher capital costs and financing difficulties. Based on this, by enhancing information transparency, reducing transaction costs and improving financing efficiency, Fintech can effectively compensate for the difficulties of private enterprises in obtaining funds in the traditional financial system, thus promoting the improvement of their new quality productivity. On the other hand, the new quality productive forces level of private enterprises is relatively low, with high potential for upward mobility, and the intervention of fintech provides a key path for them to break through the traditional development bottleneck, thus promoting the improvement of their new quality productive forces.

6.2.2. Industry differences

Science and technology innovation is the core symbol of new quality productive forces. High-tech industries rely heavily on innovation and R&D. Convenient financing channels, intelligent data analysis and automated management tools provided by Fintech can help these enterprises acquire resources more quickly, identify market trends and reduce transaction costs. By improving the efficiency of innovation and the flexibility of resource allocation, fintech can accelerate the process of technological innovation and product development in high-tech enterprises, thus better cultivating their new quality productive forces. On the other hand, the high-tech industry itself is at the forefront of technological innovation and can quickly respond to the changes brought by fintech, a new financial service model. Therefore, this paper refers to Yang and Zhou (2020) to divide the industry according to whether it is a high-tech industry or not. The regression results, as shown in column (2) of Table 8, show that the new quality productive forces of fintech on enterprises in high-tech industries is significantly positive at the 1% level, which indicates that the effect of fintech on the new quality productive forces of enterprises is greater in high-tech industries relative to non-high-tech industries, verifying the above conjecture.

6.2.3. Regional differences

Considering the significant differences in the level of economic development, distribution of financial resources and policy support in different regions of China, the impact of fintech on the new quality productive forces of enterprises may show heterogeneity in different regions. On the one hand, the eastern region has a better foundation for fintech, and enterprises can more conveniently access innovation resources and financial support, and there is more room to utilize fintech to cultivate productive forces; on the other hand, the central and western regions have a relative lack of fintech resources, and the productivity enhancement effect brought by fintech may be relatively limited by enterprises. In order to test this hypothesis, this paper, based on the differences in regional economic development, regresses fintech on the new quality productive forces of enterprises in the east and central and western regions, and the regression results are shown in column (3) of Table 8, which shows that the effect of fintech on the new quality productive forces of enterprises is more significant in the east and central regions compared with that in the west and central regions, which verifies the above hypothesis.

Table 8. Heterogeneity analysis.

	(1) State-owned	(2) Private	(3) High-tech	(4) Non-high-tech	(5) The east	(6) Midwest
Fintech	0.0374	0.1449***	0.1769***	0.0451	0.1193***	0.0812*
	(0.7530)	(4.7345)	(4.8081)	(1.2817)	(4.2302)	(1.8958)
Constant	2.5534***	2.4668***	2.8721***	1.9890***	2.5610***	2.2386***
	(5.6175)	(10.4349)	(10.8336)	(6.6677)	(10.4318)	(6.4081)
Fisher	——		——		0.061*	
Controls	YES	YES	YES	YES	YES	YES
Firm	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
N	12849	24653	22184	15314	26387	11163
Adj.R^2	0.786	0.782	0.796	0.799	0.784	0.770

7. Main conclusions and policy implications

7.1. Main conclusions

Based on data from China's A-share listed companies between 2011 and 2023, this paper systematically examines both the theoretical foundation and empirical evidence on the role of fintech in cultivating new quality productive forces within enterprises. The key findings can be summarized as follows:

First, fintech, particularly through emerging technologies like big data and artificial intelligence, plays a significant role in cultivating the new quality productive forces of enterprises. This conclusion remains robust even after conducting various tests for endogeneity and considering alternative variables.

Second, fintech enhances the traditional financial service system by strengthening the role of data in credit contracts, thus providing essential financial support for firms' science and technology innovation activities. The main mechanisms include reducing information asymmetry, easing collateral constraints, and fostering market competition. Together, these factors improve the financial industry's efficiency in serving the real economy and encourage a positive feedback loop between market competition and firms' innovation efforts.

Third, heterogeneity analysis reveals that fintech has a more pronounced impact on cultivating new productive forces in private enterprises, which are often disadvantaged in traditional financing models. Additionally, fintech's influence is particularly strong in high-tech industries at the forefront of scientific and technological innovation, and in the eastern region of China, where economic development is more mature.

7.2. Policy Implications

The findings of this paper offer several key policy insights for promoting the development of fintech and fostering the new quality productive forces of enterprises:

Deepen Structural Reform of the Financial Supply Side and Build an Intelligent Financial Ecosystem To support the healthy development of fintech and its role in cultivating new quality productive forces, the government should focus on optimizing the financial supply side and creating a more efficient, intelligent financial ecosystem. This involves increasing support for fintech innovation, enhancing policy frameworks, and encouraging collaboration between financial institutions and technology companies in their digital transformation. Financial institutions should prioritize technological research and development, utilizing emerging technologies such as artificial intelligence, big data, and blockchain to offer personalized, precise financial products and services. Moreover, financial regulation should balance innovation with risk management, ensuring that fintech can develop while addressing potential risks like market instability and data security. A robust regulatory framework will enhance fintech's role in supporting new quality productive forces in enterprises.

Strengthen "Data Empowerment" for Financial Institutions and Stimulate Market Competition China's national

big data centers have made strides in creating a data network that connects regions both domestically and internationally. To further enhance the “data empowerment” role of fintech, the construction of regional financial big data centers should be prioritized to ensure better integration and sharing of data resources. These centers should not solely rely on cloud storage, but also employ advanced security measures to facilitate secure data sharing. Financial institutions, leveraging big data, should build a comprehensive fintech-enabling network that improves resource allocation efficiency across regions. The government should encourage the collaboration between local governments, science and technology enterprises, and financial institutions to strengthen fintech’s role in the real economy, promoting a two-way empowerment between finance and industry. By enhancing data analysis and refining risk assessment models, financial institutions can optimize capital allocation and support fairer financing options for SMEs, thus alleviating information asymmetry and driving scientific and technological innovation.

Formulate Differentiated Development Strategies for Enterprises and Regions to Optimize Resource Allocation to better support the development of fintech, the government should tailor policies according to the types of enterprises and regional characteristics. For private enterprises and high-tech industries, especially in the eastern region with more mature economic development, the government should increase support for fintech applications to help these enterprises overcome traditional financing obstacles and promote their science and technology innovation activities. In contrast, for state-owned enterprises, traditional industries, and regions in central and western China, the government should focus on strengthening fintech infrastructure to enhance service coverage and universality. This will ensure that these enterprises have timely access to the financial support and resource allocation advantages provided by fintech, thereby enabling the development of new quality productive forces. By customizing fintech strategies for different types of enterprises and regions, the government can effectively foster the growth of new quality productive forces across the country.

Strengthen International Cooperation and Joint Construction of Infrastructure. Refer to the development experience of fintech in China, for economies with weak network coverage (such as Sub-Saharan Africa), cooperation between multinational telecommunications enterprises and financial institutions should be promoted. The construction of 5G networks and digital payment systems through the Public-Private Partnership (PPP) model should be carried out to lower the threshold for financial services. At the same time, international organizations (such as the International Monetary Fund, IMF) need to take the lead in formulating cross-border data security agreements to prevent geopolitical risks from impacting the fintech ecosystem. For small and medium-sized enterprises in a high-interest-rate environment, a blockchain-based supply chain finance platform can be explored. Through smart contracts, dynamic adjustment of interest rates can be achieved to alleviate the pressure of financing costs.

These policy insights emphasize the need for a targeted, coordinated approach to leveraging fintech to accelerate the cultivation of new quality productive forces, ultimately driving high-quality economic development.

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Conflict of interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

Author contributions

Conceptualization, Data curation and Formal analysis: Jiayang Meng and Xia Liu; Methodology and Software: Jiayang Meng and Jiaqian Liu, Writing original draft: Jiayang Meng and Min Bai ; Supervision, validation, review and editing: Min Bai.

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