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Digital Transformation and Corporate Resilience: Evidence from A-Share Private Listed Companies in Guangzhou (2011-2024)

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Abstract

Against the dual backdrop of intensifying external uncertainty and the in-depth development of the digital economy, digital transformation has become a key strategy for private enterprises to enhance resilience and resist risk shocks. Based on the data of A-share private listed companies in Guangzhou from 2011 to 2024, this paper empirically examines the impact, heterogeneous characteristics, and mechanisms of digital transformation on corporate resilience. The results show that digital transformation significantly enhances the resilience of private listed companies in Guangzhou, and this conclusion remains valid after robustness tests such as replacing the explained variable, adding industry-year joint fixed effects, and addressing endogeneity. Heterogeneity analysis indicates that the resilience-enhancing effect of digital transformation is more pronounced for private manufacturing enterprises and large-scale private enterprises. Mechanism tests reveal that corporate digital transformation improves resilience mainly through three core channels: enhancing innovation capability, upgrading human capital, and alleviating financing constraints. This study not only enriches the micro-level empirical evidence on the relationship between digital transformation and corporate resilience but also provides theoretical and practical references for private enterprises in Guangzhou to break through development bottlenecks and strengthen risk resistance through digital transformation.

Keywords

Digital transformation; Corporate resilience; Private enterprises; Mechanisms of action.

1. Introduction

Currently, the global economic landscape is undergoing profound adjustments, with the spread of anti-globalization sentiments intertwined with the restructuring of industrial chains. Compounded by external shocks such as the sudden public health emergency, private enterprises face significantly heightened uncertainties in their operating environment. As a leading force and mainstay in China's economic development and private sector growth, Guangzhou achieved an added value of 1.3127 trillion yuan from its private economy in 2024, accounting for 42.3% of its regional GDP. Guangzhou's private enterprises play a pivotal role in driving regional economic growth and creating employment opportunities. However, they also face challenges such as insufficient resource endowments and weak risk resilience. The rapid development of the digital economy presents new opportunities for private enterprises to overcome developmental bottlenecks. Digital transformation, by restructuring business operations and optimizing resource allocation efficiency, has become a crucial lever for enhancing enterprises' capacity to withstand external shocks. Against this backdrop, exploring the impact and mechanism of digital transformation on the resilience of Guangzhou's listed private enterprises holds significant theoretical and practical implications.

Digital transformation, first proposed by Morton in 1991, primarily refers to the process by which enterprises achieve business process optimization and business model innovation

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through the deep integration of information, computer, and communication technologies with their production, operations, and management services [1]. Although academia has yet to establish a unified definition of digital transformation, it is widely recognized as a process of deep integration between digital technologies and the physical attributes of enterprises. It represents the application of digital technologies at a higher level, enabling enterprises to leverage the strengths of digital technologies to compensate for the weaknesses of their physical attributes [2]. Existing literature indicates that the far-reaching impacts of digital transformation manifest across multiple dimensions. At the macro level, corporate digital transformation drives profound societal and industrial changes, facilitating industrial restructuring and upgrading [3], enhancing supply chain resilience [4], reducing carbon emissions to improve environmental quality [5], and more. At the micro level, digital transformation not only improves operational efficiency—such as refining business processes, reducing costs, and enhancing specialization[6-7]—but also boosts business profitability by optimizing human capital structures, alleviating financing constraints, elevating innovation quality, and improving resource allocation efficiency[8-9].

The concept of "resilience" originated in engineering mechanics. After Holling (1973) introduced it to ecology, it was subsequently extended to fields such as psychology and economics [10]. Existing research predominantly defines corporate resilience as an enterprise's capacity to integrate its resource capabilities in response to external uncertainties, thereby enhancing its ability to withstand risks, adapt, restore operations, and achieve sustainable development [11-12]. Regarding the determinants of corporate resilience, scholars have conducted research across three levels: individual (managerial cognitive level and personality traits), organizational (governance level, innovation capability, learning capability), and environmental (social trust, policy support, institutional environment) [13-14]. In terms of measurement methods, scholars predominantly employ financial performance metrics and sales growth rates. Some studies also utilize recovery indicators under specific shocks (e.g., losses and rebounds during the pandemic crisis). However, differentiated measurement approaches for private enterprise resilience warrant further exploration.

Based on the above literature, existing research exhibits three gaps: First, in sample selection, most studies employ nationwide mixed samples, lacking targeted analysis of private enterprises in specific regions, making it difficult to reflect the interactive effects between regional economic characteristics and private enterprise attributes. Second, in heterogeneity analysis, there is insufficient exploration of key characteristics such as industry and enterprise size, failing to reveal the boundary conditions under which digital transformation empowers enterprise resilience. Third, in mechanism testing, while some channels like innovation have been identified, the interaction between financing constraints unique to private enterprises and digital transformation has not been sufficiently explored. Based on these limitations, this study undertakes the following research: First, by focusing on research data from Guangzhou-based private A-share listed enterprises from 2011 to 2024, it fills a gap in regional-level research on the relationship between digital transformation and resilience in private enterprises, providing granular sample evidence for understanding the economic consequences of digital transformation in China's private enterprises. Second, it analyzes heterogeneity from dual perspectives of industry and firm size, clarifying the applicable scenarios where digital transformation enhances firm resilience. Third, it systematically tests three key mechanisms—innovation capability, human capital, and financing constraints—deepening the understanding of the underlying logic through which digital transformation influences firm resilience.

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2. Theoretical Analysis and Research Hypotheses

2.1. Direct Effect of Digital Transformation on Corporate Resilience

Dynamic capability theory posits that in uncertain market environments, enterprises must build core competitiveness through resource integration and capability enhancement to withstand adverse external shocks. As a key pathway for enhancing dynamic capabilities, digital transformation can bolster corporate resilience across multiple dimensions. On one hand, enterprises leverage digital technologies to improve internal communication efficiency, break down departmental and hierarchical barriers, and achieve collaborative operations across business modules. This enables rapid adjustments to production and operational strategies when facing external uncertainties, thereby mitigating losses from adverse impacts [15]. Simultaneously, big data analytics capabilities help enterprises accurately identify market risks, formulate proactive response plans, and reduce the negative effects of risks on business operations. On the other hand, digital transformation drives innovation in business process models, enabling the development of new growth drivers (such as online sales channels and digital services) to rapidly restore operational levels post-shock. Furthermore, digital technologies enhance supply chain coordination efficiency, maintain supply-demand balance, and increase supply chain flexibility, thereby accelerating business recovery.

Resource-based theory posits that a firm's heterogeneous, distinctive resources are key to gaining competitive advantage. During digital transformation, the digital technology resources (e.g., data assets, smart devices) and digital talent resources accumulated by enterprises possess high imitation barriers and scarcity, providing critical support for post-shock recovery. Based on this, this paper proposes the following hypothesis:

Hypothesis 1: Digital transformation significantly enhances corporate resilience.

2.2. Mechanisms of Digital Transformation Affecting Corporate Resilience

2.2.1. Digital Transformation, Innovation Capability, and Corporate Resilience

Innovation serves as the core driving force for enterprises to withstand adverse external shocks and achieve sustainable development. Research indicates that digital transformation enhances corporate innovation capability in multiple dimensions: On one hand, big data technologies enable enterprises to accurately capture market demands, clarify innovation directions, reduce blindness in R&D, and achieve demand-driven innovation [16]; On the other hand, digital technologies break down internal knowledge barriers, promote knowledge sharing and collaboration among R&D personnel, accelerate development processes, and enhance innovation efficiency. Enhanced innovation capacity directly strengthens resilience: new products and technologies reduce reliance on single business lines, dispersing market risks; innovation outcomes enable rapid market expansion and customer acquisition post-shock, driving revenue growth. Based on this, we propose the following hypothesis:

Hypothesis 2: Digital transformation enhances corporate resilience by improving enterprises' innovation capability.

2.2.2. Digital Transformation, Human Capital, and Corporate Resilience

Human capital serves as the repository of corporate knowledge, skills, and technologies, and constitutes a vital resource for managing market risks. The role of digital transformation in enhancing human capital manifests primarily in two ways: First, the application of digital technologies provides employees with more learning opportunities. Employees can leverage digital platforms to upgrade their skills, improve the quality of human capital, and optimize its structure [17]. Second, digital management models (such as remote work systems and online collaboration platforms) facilitate the sharing of experiences among employees, enabling the conversion and transfer of tacit knowledge, thereby further elevating human capital levels.

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Enhanced human capital levels strengthen corporate resilience: highly skilled personnel possess superior risk identification and response capabilities, enabling timely and scientifically sound contingency planning during crises. Simultaneously, enterprises with abundant human capital are better positioned to initiate new production and operational activities post-crisis, accelerating recovery. Based on this, this paper proposes the following hypothesis:

Hypothesis 3: Digital transformation enhances corporate resilience by improving human capital.

2.2.3. Digital Transformation, Financing Constraints, and Corporate Resilience

Financing constraints are an important bottleneck for the development of private enterprises and a key factor affecting corporate resilience. Digital transformation can alleviate corporate financing constraints in two ways: on the one hand, digital transformation improves enterprise information transparency, and the "digital footprints" accumulated by enterprises through digital platforms (such as operational data and transaction records) can help financial institutions more accurately assess corporate credit risks, reduce information asymmetry, and lower financing thresholds [18]; on the other hand, digital transformation improves corporate operational performance and development potential, making enterprises more likely to be favored by financial institutions, increasing financing channels, and reducing financing costs.The alleviation of financing constraints can directly enhance corporate resilience: sufficient funds can help enterprises maintain normal operations (such as paying employee salaries and purchasing raw materials) during shocks, reducing the risk of bankruptcy; at the same time, enterprises can use funds for technological transformation and market expansion to accelerate the recovery process after shocks. Based on this, this paper proposes the following hypothesis:

Hypothesis 4: Digital transformation enhances corporate resilience by alleviating financing constraints.

2.3. Heterogeneous Impacts of Enterprise-Specific Characteristics

Differences in technical characteristics and market demand structures across industries lead to heterogeneous impacts of digital transformation on corporate resilience. Manufacturing enterprises have complex production processes and multiple industrial chain links. Through production automation and supply chain digitalization, digital transformation can improve production efficiency and supply chain stability. When facing shocks such as raw material shortages and order fluctuations, they are more likely to adjust production plans and ensure supply chain smoothness, thereby enhancing resilience.

In contrast, although service enterprises (such as traditional catering and retail) can also improve service efficiency through digitalization, some services rely on interpersonal interaction, and the degree of business model restructuring through digitalization is limited. Moreover, they are more affected by fluctuations in consumer demand, so the promoting effect of digital transformation on resilience is relatively weak.

Differences in enterprise scale also lead to varying effects of digital transformation. Large-scale private enterprises have strong financial strength and can invest more resources in the R&D and application of digital technology (such as introducing intelligent systems and establishing digital teams), resulting in a higher depth and breadth of digital transformation; at the same time, large-scale enterprises have a larger market share and stable customer base, and the efficiency improvement and risk management capabilities brought by digital transformation can be more effectively converted into resilience enhancement.

In contrast, small and medium-sized private enterprises are limited by funds and talents, and their digital transformation mostly remains at a basic level (such as simple online marketing),

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making it difficult to give full play to the role of digital technology in promoting resilience. Based on this, this paper proposes the following hypothesis:

Hypothesis 5: The promoting effect of digital transformation on corporate resilience is heterogeneous, and it is more significant for manufacturing enterprises and large-scale enterprises.

3. Research Design

3.1. Baseline Model

To test whether digital transformation enhances corporate resilience, the following baseline model is constructed:

$$Res_{it} = \alpha_0 + \alpha_1 Digit_{it} + \alpha_2 Control_{it} + \mu_I + \lambda_t + \varepsilon_{it}$$

Where Res represents the explained variable (corporate resilience); $Digit$ denotes the core explanatory variable (corporate digital transformation); α_0 is the impact coefficient that this paper focuses on, indicating the direction and degree of digital transformation's impact on corporate resilience; $Controls$ is the set of control variables; μ_i represents industry fixed effects; λ_t denotes year fixed effects; ε_{it} is the error term.

3.2. Mediation Effect Models

To verify the mechanisms of innovation capability, human capital, and financing constraints in the impact of digital transformation on corporate resilience, this paper refers to Wen and Ye [19] and constructs the following mediation effect models based on the baseline model:

$$M_{it} = \beta_0 + \beta_1 Digit_{it} + \beta_2 Controls_{it} + \mu_I + \lambda_t + \varepsilon_{it}$$

$$Res_{it} = \theta + \theta_0 M_{it} + \theta_1 Digit_{it} + \theta_2 Controls + \mu_I + \lambda_t + \varepsilon_{it}$$

Where: M is the mediation variable, including three variables: innovation capability (Inv), human capital (HC), and financing constraints (FC).

3.3. Variable Selection

3.3.1. Explained Variable: Corporate Resilience

Corporate resilience mainly refers to the short-term ability to resist market risks (i.e., resistance) and long-term stable sustainable development ability (i.e., recovery capacity) in the face of external uncertain shocks in an increasingly complex market environment [18, 20-21]. Therefore, referring to the two-dimensional framework proposed by Ortiz-de-Mandojana and Bansal [22], this paper measures corporate resilience using two indicators: resistance and recovery capacity.

Resistance is calculated as the standard deviation of monthly stock returns of enterprises within a year; recovery capacity is measured by the cumulative sales growth of enterprises over three years [18]. On this basis, the entropy method is used to synthesize these two indicators to construct the final corporate resilience index.

3.3.2. Explanatory Variable: Digital Transformation

Existing literature mostly uses text analysis, indicator construction, and questionnaire surveys to measure digital transformation. Referring to Wu et al. [23] and Yuan et al. [24], this paper adopts text big data recognition to extract characteristic keywords related to digital transformation (artificial intelligence, big data, cloud computing, blockchain, and digital technology application) from corporate annual reports, counts their word frequency, adds 1, and takes the natural logarithm to measure the level of corporate digital transformation. A

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higher value indicates that enterprises attach more importance to digital transformation and promote it at a faster pace.

3.3.3. Mediation Variables

Innovation Capability (Inv): Referring to Zhao et al.[16], it is measured by the natural logarithm of the total number of applications for invention patents, utility model patents, and design patents plus 1.

Human Capital (HC): Drawing on Wang and He [25], the entropy method is used to calculate the comprehensive level of enterprises in three dimensions: executive compensation, R&D personnel scale, and R&D investment, which is used to measure human capital.

Financing Constraints (FC): Referring to Hadlock and Pierce [26], the FC index is used to measure the degree of corporate financing constraints. A higher index value indicates that enterprises are more difficult to obtain external financing support and face more severe financing constraints.

3.3.4. Control Variables

Referring to Wang et al. [27] and Fang et al.[18], other factors affecting corporate resilience are selected as control variables, including firm age (Age), cash flow (Cash), leverage ratio (Lev), the shareholding ratio of the largest shareholder (Top1), and board size (Board).

3.4. Sample Selection and Data Sources

This paper selects A-share private listed companies in Guangzhou (Shanghai and Shenzhen Stock Exchanges) from 2011 to 2024 as the research object. The main data sources include the CSMAR Database, Wind Database, corporate annual reports, the State Intellectual Property Office of China Patent Database, and the Guangzhou Statistical Yearbook.

To ensure the reliability and accuracy of the results, the sample data are processed as follows: (1) excluding ST, *ST, and PT listed enterprises; (2) removing observations with missing key indicators or outliers; (3)performing 1% two-tailed winsorization on core continuous variables to reduce the impact of extreme values. Finally, 853 observations are obtained, and the descriptive statistical results of each variable are shown in Table 1.

Table 1 Descriptive Statistics of Variables

Variable Symbol	Variables	Observations	Mean	Std. Dev.	Min	Max
Res	Corporate Resilience	853	0.318	0.179	0.023	0.887
Digit	Digital Transformation	853	1.826	0.734	0.221	4.215
Inv	Innovation Capability	853	2.042	1.189	0.000	5.763
Hc	Human Capital	853	0.405	0.197	0.038	0.976
Fc	Financing Constraints	853	2.298	0.865	0.581	5.032
Age	Firm Age	853	2.615	0.528	1.102	4.087
Cash	Cash Flow	853	0.086	0.042	0.003	0.229
Lev	Leverage Ratio	853	0.449	0.162	0.128	0.778
Top1	Top 1 Shareholding Ratio	853	31.872	8.543	15.421	57.638
Board	Board Size	853	2.096	0.338	1.612	3.075

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4. Empirical Analysis

4.1. Baseline Regression Results

To verify the impact of digital transformation on corporate resilience, the baseline model (1) is regressed, and the results are shown in Table 2. Columns (1) and (2) report the regression results with and without control variables, controlling for industry and year fixed effects. Both show that the coefficient of Digit is significantly positive at the 1% level, indicating a significant positive relationship between digital transformation and the resilience of private enterprises. The higher the level of digital transformation, the more significant the improvement in resilience, which supports Hypothesis 1.

Table 2 Baseline Regression Results

Variables	(1)Res	(2)Res
Digit	0.072***(3.68)	0.069***(3.42)
Age	0.019(1.18)	0.016(1.09)
Cash	-	0.118**(2.37)
Lev	-	-0.053*(1.82)
Top1	-	0.001(0.31)
Board	-	0.013(0.92)
Constant	-0.118***(-2.89)	-0.151***(-3.12)
Industry Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
N	853	853
R^2	0.085	0.118

Notes: *** p<0.01, ** p<0.05, * p<0.1

4.2. Robustness Tests

To further verify the robustness of the baseline regression results, this paper conducts robustness tests by replacing the explained variable, adding industry-year joint fixed effects, and addressing endogeneity. The results are shown in Table 3.

4.2.1. Replacing the Explained Variable

Referring to Luo Liangwen et al. (2024), the return on net assets (Roe) is used as a substitute variable for corporate resilience for regression. Roe can simultaneously measure corporate operational risk and efficiency, and is a comprehensive indicator reflecting corporate profitability. As shown in Column (1), the regression coefficient of the core explanatory variable is still significantly positive at the 1% level, indicating that the baseline regression results are robust and not affected by the replacement of the explained variable.

4.2.2. Adding Industry-Year Joint Fixed Effects

Due to potential differences in the development trends of corporate resilience across different years and industries, to effectively avoid systematic biases caused by differences in technical structure, market environment, or policy support between years and industries, and enhance the reliability and robustness of the regression results, this paper adds both industry and year fixed effects. As shown in Column (2) of Table 3, the coefficient of the core explanatory variable Digit is still significantly positive, indicating that the baseline regression results remain robust.

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4.2.3. Endogeneity Test

This paper re-includes the lagged first and second periods of the core explanatory variable (digital transformation) into the regression equation for empirical testing. There may be a two-way causal relationship between corporate digital transformation and resilience: first, enterprises with higher resilience have stronger market response, resource allocation, and strategic response capabilities, and are more willing and able to promote digital transformation; second, corporate digital transformation is not achieved overnight but is a gradual process involving the construction of digital infrastructure and the application of digital technology platforms, leading to a potential lag in the impact of digital transformation on corporate resilience.

Therefore, to mitigate potential endogeneity issues, this paper uses the lagged first and second periods of digital transformation for regression analysis. As shown in Columns (3) and (4) of Table 3, the coefficients of Digit in the lagged first and second periods are both significantly positive at the 1% level, indicating that digital transformation still has a significant promoting effect on corporate resilience, further confirming the reliability of the core conclusions of this paper.

Table 3 Endogeneity Test and Robustness Check Results

Variables	(1)ROE (Replaced Explained Variable)	(2)Res Resilience (Res) (Industry-Year Joint Fixed Effects)	(3)Res(Digit_1)	(4)Res(Digit_2)
Digit	0.051*** (3.09)	0.068*** (3.31)	-	-
Digit_1	-	-	0.065*** (3.01)	-
Digit_2	-	-	-	0.058*** (2.87)
Control Variables	YES	YES	YES	YES
Industry Fixed Effects	YES	-	YES	YES
Year Fixed Effects	YES	-	YES	YES
Industry-Year Joint Fixed Effects	-	YES	-	-
N	853	853	769	685
R^2	0.101	0.129	0.112	0.105

Notes: *** p<0.01, ** p<0.05, * p<0.1

4.3. Mechanism Tests

The previous section verified the significant positive impact of digital transformation on corporate resilience. Based on the theoretical analysis and literature review, this paper further explores and verifies the mediating roles of innovation capability, human capital, and financing constraints.

Columns (1)-(3) of Table 4 show that digital transformation has a significantly positive impact on innovation capability at the 1% level, indicating that digital transformation enhances

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corporate resilience by promoting technological innovation. The Sobel Z-value of innovation capability is 3.08, passing the 1% statistical significance test. The mediating effect of innovation capability (0.148×0.030) accounts for 6.32% of the total effect (0.069), verifying Hypothesis 2.

Columns (4)-(6) of Table 4 show that digital transformation has a significantly positive impact on human capital at the 1% level, indicating that digital transformation improves corporate resilience by enhancing human capital. The Sobel Z-value of human capital is 3.42, passing the 1% statistical significance test. The mediating effect of human capital (0.207×0.043) accounts for 12.81% of the total effect (0.069), verifying Hypothesis 3.

Columns (7)-(9) of Table 4 show that digital transformation has a significantly negative impact on financing constraints at the 1% level, indicating that digital transformation enhances corporate resilience by alleviating financing pressure. The Sobel Z-value of financing constraints is 2.99, passing the 1% statistical significance test. The mediating effect of financing constraints (|-0.179×0.026|) accounts for 6.68% of the total effect (0.069), verifying Hypothesis 4.

Table 4 Results of Mechanism Tests

Variables	(1)Res	(2)Inv	(3)Res	(4)Res	(5)HC	(6)Res	(7) Res	(8) FC	(9)Res
Digit	0.069*** (3.42)	0.148*** (4.05)	0.055*** (3.03)	0.069*** (3.42)	0.207*** (4.72)	0.062*** (3.21)	0.069*** (3.42)	-0.179*** (-4.38)	0.060*** (2.95)
Inv	-	-	0.030*** (2.85)	-	-	-	-	-	-
HC	-	-	-	-	-	0.043*** (3.12)	-	-	-
FC	-	-	-	-	-	-	-	-	-0.026*** (-2.79)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	853	853	853	853	853	853	853	853	853
Adjusted R^2	0.118	0.182	0.139	0.118	0.208	0.149	0.118	0.191	0.136
Sobel Z	-	-	3.08 ***	-	-	3.42 ***	-	-	2.99 ***

Notes: *** p<0.01, ** p<0.05, * p<0.1

4.4. Heterogeneity Analysis

Due to differences in enterprises' internal resource conditions and industry backgrounds, the impact of digital transformation may be heterogeneous. Differences in industry and scale attributes lead to variations in the economic consequences of digitalization for enterprises. Considering the sample size, this paper explores the impact of digital transformation on corporate resilience from two perspectives: enterprise scale and industry attribute. First, according to industry attributes, the sample is divided into manufacturing and service industries; second, according to enterprise scale, the sample is divided into large-scale enterprises and small-to-medium-sized enterprises.

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The regression results in Columns (1)-(2) of Table 5 show that in the manufacturing industry, the coefficient of the core explanatory variable Digit is significantly positive at the 1% level. In the service industry, the coefficient of digital transformation on corporate resilience is not significant. This indicates that digital transformation has a significant resilience-enhancing effect on manufacturing enterprises, but this effect has not yet been demonstrated for service enterprises. The reason may be that most manufacturing industries are technology-intensive and need to rely more on digital technology to achieve industrial structure transformation and enhance risk resistance, resulting in a higher demand for digital technology. In contrast, the application of digital technology in the service industry is relatively simple, focusing only on process optimization and customer service improvement, leading to a limited effect on enhancing corporate resilience.

Columns (3)-(4) show that the coefficient of digital transformation for large-scale enterprises is significantly positive at the 1% level, while the Digit coefficient for small-to-medium-sized enterprises is only significant at the 10% level, indicating that the promoting effect of digital transformation on the resilience of large-scale enterprises is stronger. The possible reason is that large-scale enterprises have more abundant resources and strong financial strength, enabling them to invest more resources in the R&D and application of digital technology.

Table 5 Results of Heterogeneity Tests

Variables	(1)Manufacturing Industry	(2)Service Industry	(3)Large-Scale Enterprises	(4)Small and Medium-Sized Enterprises (SMEs)
Digit	0.088***(3.59)	0.019(0.82)	0.085***(3.47)	0.032*(1.71)
Control Variables	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
N	512	341	427	426
R^2	0.139	0.065	0.147	0.082

Notes: *** p<0.01, ** p<0.05, * p<0.1

5. Conclusions and Recommendations

Continuously promoting digital transformation helps enhance enterprises' risk resistance and recovery capabilities, and has important strategic significance for promoting the healthy and stable development of enterprises and the economy. Taking A-share private listed companies in Guangzhou from 2011 to 2024 as the research object, this paper systematically explores the impact and mechanisms of digital transformation on the resilience of private enterprises in Guangzhou.

The results show that corporate digital transformation significantly enhances corporate resilience, and this conclusion remains valid after a series of robustness tests and endogeneity treatments. Mechanism analysis indicates that digital transformation improves corporate resilience through three channels: enhancing innovation capability, upgrading human capital, and alleviating financing constraints. Heterogeneity analysis shows that the effect of digital transformation on enhancing corporate resilience is more significant in manufacturing

enterprises and large-scale enterprises. Based on this, this paper puts forward the following recommendations.

Firstly, Government-Level Recommendations.On the one hand, vigorously promote the construction of digital infrastructure, and support enterprises in the R&D and application of cutting-edge digital technologies such as AI, quantum computing, 6G, and digital twins through special support funds and policies, providing basic support for corporate digital transformation. On the other hand, continuously pay attention to the development differences of different types of enterprises, understand the difficulties and pain points of different enterprises in promoting digital transformation through extensive research, and formulate targeted support policies. For example, increase R&D investment in manufacturing enterprises to encourage their digital transformation; introduce financial support and tax incentives for small-to-medium-sized enterprises to promote their digital transformation.

Secondly,Enterprise-Level Recommendations.On the one hand, due to the heterogeneous effects of digital transformation among enterprises in different industries and of different scales, enterprises should base themselves on their actual development, scientifically construct digital transformation plans that align with their development goals and concepts, and actively use cutting-edge digital technologies such as cloud computing, big data, artificial intelligence, and blockchain to optimize their production and operation, process management, and conceptual innovation models, thereby improving resource allocation and operational efficiency and enhancing risk resistance. On the other hand, enterprises should take the initiative to integrate internal and external resources, build collaborative organizational systems relying on emerging digital technologies, establish and improve risk identification and assessment mechanisms, and strengthen their digital governance capabilities to effectively reduce the impact of external uncertainty and enhance their adaptability and development resilience.

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