

# ***The Impact of Management's Focus on Digitalization on Corporate Innovation***

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**Abstract.** Management's strategic emphasis on digital technology affects corporate performance. Researchers and the market both care about this. We study firms listed on China's Science and Technology Innovation Board (STAR) Market from 2019 to 2024. We measure management's digital focus by counting digital-related words in annual reports. We then see how this focus influences invention patent applications. Management's digital focus significantly boosts invention patent filings at STAR firms. This result holds in many robustness tests. The innovation-enhancing effect is not uniform. The effect is stronger among state-owned enterprises. It is also stronger among firms in less developed regions. Ownership structure and regional context matter. These findings show how a digital mindset drives innovation on the STAR Market. The pathways differ across ownership types and regions. The results offer guidance for corporate digital strategy. The results also help design innovation policy.

**Keywords:** Management's focus on digitalization, STAR Market corporates, Corporate innovation, Invention patents, Text analysis

## **1. Introduction**

Improving a firm's ability for independent innovation is vital. It matters for a developing economy. The economy wants technological self-reliance. It also wants to use the ongoing wave of technological and industrial change. Deep integration between scientific and technological innovation and industrial upgrading is key to this process. The STAR Market serves "hard tech" corporates. Its listing rules break away from the main board's strict profitability requirements. Corporates in the R&D phase can access the capital market. These corporates do not yet have stable profits. This institutional design attracts cutting-edge technology corporates. These corporates are in intensive R&D stages. They are in technological scale-up stages. Their innovation capabilities deserve close attention.

Innovation at these firms faces steep hurdles. Their technologies require massive R&D investment. Their technologies undergo rapid iteration. Their technologies have long payback periods. Their technologies depend heavily on core projects. They also depend on key technical talent. Their ability to sustain innovation after going public remains highly uncertain. It is hard for them to cover innovation costs through market returns in the short term. A clear path to commercialization is often missing. Sustained strategic drivers are also missing. These corporates

struggle to turn R&D investments into tangible outputs. We need to find ways to incentivize these firms. We need them to plan and invest in innovation over the long term. That will strengthen their innovation capacity. This is a pressing issue.

Management is the architect of corporate strategy. Management is also the executor. Management translates macro-level policy into micro-level firm actions. Management assumes primary responsibility for operations [1]. Firms are embracing digitalization faster. Management's digital focus speeds up this process. This focus helps corporates overcome innovation bottlenecks. A key question emerges. Can management's commitment to digitalization genuinely increase a firm's innovative output?

Existing research looks at factors that influence corporate innovation. It also looks at how management characteristics affect firms. Digital transformation is one key driver. It enhances independent innovation capabilities. It upgrades human capital. It reduces operating costs [2]. Modular platform architectures allow core components to support many entrepreneurial activities. They support innovative activities at scale [3]. More executives with international backgrounds on the team are linked to more patent applications. Management's international background matters for innovation [4]. Management's grasp of digital marketing and digital production improves business performance [5]. Heterogeneity in the executive team helps digital transformation [6].

The literature provides limited evidence on one question. The question is how management's digital focus shapes corporate innovation. Studying this link can broaden the view on corporate innovation. It can deepen our understanding of the logic between management and innovation. This paper uses annual reports and patent data from STAR Market firms. It measures the degree of management's digital focus. It measures the depth of corporate innovation. It runs regression analyses on these variables.

## 2. Theoretical analysis

Digitalization is a strategic priority. Corporates want a competitive edge. Management is the core decision-making body. Management plays a direct role. Management plays a leading role in firm development. Management's digital focus drives innovation indirectly. It improves operational efficiency. It speeds up the digitalization process. Strong digital emphasis in annual reports is a signal. The signal means digitalization is part of the core strategic agenda [7]. This strategic priority shapes decisions. Firms invest more in digital infrastructure. Firms invest in process optimization. Internal coordination costs go down. Operational efficiency goes up. Digitalization changes the innovation model. A digital focus also helps attract digital talent. It helps deploy digital talent. This strengthens the human capital base for innovation.

Management's digital emphasis works through a dual channel. It streamlines operations. It reconfigures the innovation process. It draws in digital talent. The talent revitalizes R&D teams. These forces come together. They translate into tangible innovative output.

**H1:** Management's digital focus has a positive impact on invention patent applications. This applies to corporates listed on the STAR Market.

## 3. Research design

### 3.1. Model specification

STAR Market corporates have short operating histories. Within-firm variation in digital focus is small during the sample period. Traditional fixed-effects models cannot identify the impact well. We

use a model with industry fixed effects. We also use year fixed effects. The regression analysis uses this model. The model is set up as follows:

$$Innovation_{i,t} = a_0 + a_1 DigitalFocus_{i,t} + a_2 Controls_{i,t} + \sum Firm_i + \sum Year_t + \varepsilon_{i,t}$$

Here,  $a_0$  is the intercept term,  $a_1$  is the regression coefficient of the core explanatory variable, and  $a_2$  is the vector of regression coefficients for the control variables; the dependent variable  $Innovation_{i,t}$  represents the innovation of STAR Market corporates; the core explanatory variable  $DigitalFocus_{i,t}$  represents management's focus on digitalization;  $Controls_{i,t}$  is a set of corporate-level control variables, including corporate size ( *Size* ), debt-to-asset ratio ( *Lev* ), profitability ( *ROA* ), growth ( *Growth* ), cash flow level ( *CF* ), and corporate age ( *Age* );  $Firm_i$  and  $Year_t$  are industry and year fixed effects, respectively, used to control for potential systematic differences at the industry and year levels;  $i$  is the corporate number, and  $t$  is the year;  $\varepsilon_{i,t}$  is the random error term.

## 3.2. Measuring management's focus on digitalization

### 3.2.1. Indicator system and measurement method

This paper draws on a series of classic works focusing on digital transformation [8, 9]. By modifying and refining the word frequencies found in these sources, we have identified specific keywords related to digital transformation. Building on this foundation, we excluded expressions preceded by negative words to further expand the set of word frequencies that can describe digital characteristics. By categorizing the word frequencies, we have structured the data into Tab.1. This dataset covers a broad scope and includes diverse sample types, enabling a more detailed and comprehensive description of the level of digitalization.

Table 1. Word frequencies describing digitalization characteristics

| Category                           | Word Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Artificial Intelligence Technology | Artificial Intelligence, Business Intelligence, Image Understanding, Investment Decision Support Systems, Intelligent Data Analysis, Intelligent Robots, Machine Learning, Deep Learning, Semantic Search, Biometric Technology, Facial Recognition, Speech Recognition, Authentication, Autonomous Driving, Natural Language Processing, Supervised Learning, Machine Translation, OCR Technology, Computer Vision, Machine Vision, Robots, Intelligent Question-Answering, Expert Systems, Neural Networks, Learning Algorithms, Automated Reasoning, Driverless Vehicles, AI Labs, AI Platforms, AI Facilities, AI Devices, AI Infrastructure, Robots, AI Systems, Smart Terminals, Intelligent Information Systems, Level of Intelligence, Intelligent Connectivity |
| Blockchain Technology              | Digital currency, smart contracts, distributed computing, decentralization, Bitcoin, consortium blockchain, differential privacy technology, consensus mechanisms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Cloud Computing Technology         | Digital currency, smart contracts, distributed computing, decentralization, Bitcoin, consortium blockchain, differential privacy technology, consensus mechanisms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

Table 1. (continued)

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Big Data Technology                | Big Data, data mining, text mining, data visualization, heterogeneous data, credit reporting, augmented reality, mixed reality, virtual reality, text extraction, big data laboratory, big data platform, big data infrastructure, big data equipment, big data information systems, big data technology systems, data elements, data property rights, trusted data space, data space, public data, high-quality data, datasets, data annotation, privacy-preserving computing, data circulation, circulation infrastructure, data platforms, cross-border data flow, data industry, data-element-driven                                                                                                                                                              |
| Broadly Defined Digital Technology | Digital laboratories, digital platforms, digital communities, digital patents, digital networks, digital facilities, digital devices, digital infrastructure, digital terminals, digital information systems, digital technology systems, 3D printing equipment, comprehensive digitization, urban digital transformation, the digital domain, the digital ecosystem, the digital society, digital and intelligent transformation, industry digitization, digital talent, the digital environment, high-level digital talent, digital competitiveness, digital empowerment                                                                                                                                                                                            |
| Technological Innovation           | Digital Twins, Metaverse, Virtual Humans, 3D Printing, 5G Technology, Mobile Internet, Industrial Internet, Digital Technology, Nanocomputing, Intelligent Planning, Intelligent Optimization, Smart Wearables, Artificial Intelligence+, New-Quality Productive Forces                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Process Innovation                 | Smart Manufacturing, Smart Customer Service, Smart Marketing, Digital Marketing, Unmanned Retail, Unmanned Factories, Mobile Payments, Third-Party Payments, NFC Payments, Human-Computer Interaction, Social Networks, Market-Based Allocation, Integrated Data Market, Single Ledger, Single Platform, Integration, Catalog Identification, Identity Registration, Interface Requirements, Unified Standards, Digitalization Projects, One Chain, One Policy, Digital-Ready Reform, Tiered Development, Digital Government, Urban Operations, Governance Hub, Data Development and Utilization                                                                                                                                                                      |
| Business Innovation                | Smart Agriculture, Smart Transportation, Smart Healthcare, Smart Home, Smart Investment Advisory, Smart Culture and Tourism, Smart Environmental Protection, Smart Grid, Smart Energy, Internet Healthcare, Internet Finance, Digital Finance, Fintech, Quantitative Finance, Open Banking, NetUnion, Internet Plus, Data Market, Industrial Integration, Cluster Ecosystem, Data Industry Agglomeration Zone, Digital Industry Cluster, Consumer Scenarios, New Scenarios, Public Service Platform, Transformation Platform, Digital Transformation Service Provider, Platform Economy, Smart Logistics, Overseas Platforms, Cross-Border E-commerce, Silk Road E-commerce, Digital Consumption, Smart Connected New Energy Vehicles, Industry-Education Integration |

This paper employs the word frequency density method to measure the degree of digitalization [10]. The vocabulary from the dictionary in Tab.1 was imported into the "jieba" word segmentation library in Python. Searching, matching, and word frequency counting were performed based on the key terms in Tab.1 to calculate the total frequency of digitalization-related terms appearing in each corporate's annual report. This total was then divided by the length of the MD&A section to determine the frequency of these key terms in each corporate's annual report. Since the calculated values are relatively small, for ease of presentation, this frequency is multiplied by 100 and used as the variable representing management's focus on digitalization (  $DigitalFocus_{i,t}$  ) in the model.

### 3.2.2. Trend analysis

Using the year as the independent variable and the annual average level of management's focus on digitalization (calculated by summing the digitalization focus scores of all STAR Market corporates for each year and then taking the average) as the dependent variable, a trend line graph was plotted. The results are shown in Fig.1.

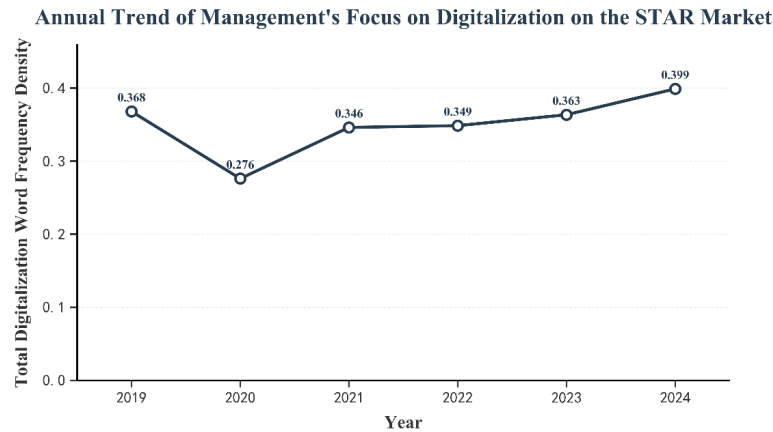


Figure 1. Annual trend of management's focus on digitalization on the STAR Market

As can be seen from the figure, with the exception of 2019 (the year the STAR Market was first established), the annual trend in management's focus on digitalization at STAR Market corporates has shown a year-on-year increase. This indicates that management's focus on digitalization at STAR Market corporates is growing year by year, and is therefore inevitably linked to the corporates' future innovation and development. Consequently, we can examine the extent of management's focus on digitalization to determine whether it influences corporate innovation.

### 3.3. Corporate innovation

The dependent variable is innovation among STAR Market corporates ( $Innovation_{i,t}$ ). Following the methodology outlined in a relevant paper [11], this is measured by taking the natural logarithm of the total number of patent applications filed by a corporate in a given year plus one. Since invention patents have a longer average authorization cycle and a lower authorization rate than utility model and design patents, they are better indicators of a corporate's genuine technological breakthroughs and serve as a concentrated manifestation of substantive technological innovation. Therefore, this study limits the analysis to invention patents and uses the natural logarithm of the total number of invention patent applications filed by STAR Market corporates in the current year (plus one) as the measure.

### 3.4. Control variables

To control for factors influencing corporate innovation, we drew on the research [12, 13] to select and control for certain corporate-level control variables that may affect corporate innovation. Specifically, these include corporate size ( $Size$ ): the natural logarithm of total assets; debt-to-asset ratio ( $Lev$ ): total liabilities / total assets; profitability ( $ROA$ ): net income / total assets; growth ( $Growth$ ): revenue growth rate; cash flow level ( $Cashflow$ ): net cash flow from operating

activities / total assets; and years since incorporation ( *Age* ): observation year – year of incorporation (or its natural logarithm).

### 3.5. Data sources and sample selection

The annual report data in this paper are sourced from the annual reports of various listed corporates; the patent data are sourced from the China National Intellectual Property Administration. The research sample consists of the MD&A reports for corporates listed on the Shanghai and Shenzhen A-share markets and the STAR Market from 2010 to 2024, as well as the number of invention patent applications filed by these corporates during the same period.

For the text-based annual report data, we first performed preliminary data cleaning. Since the STAR Market officially launched in July 2019, we filtered the data to include corporates from 2019 to 2024, and then further identified STAR Market corporates by screening for stock codes beginning with 688. Finally, special whitespace was removed from the text, retaining only Chinese characters, English letters, and numerals, while removing punctuation marks. For each corporate's patent data, we similarly selected corporates from the 2019–2024 period and further filtered for STAR Market corporates by identifying those with stock codes beginning with "688." If a corporate's number of invention patent applications was missing or non-numeric, it was treated as 0.

## 4. Empirical results

### 4.1. Variable definitions and descriptive statistics

Tab.2 presents the descriptive statistics for the main variables.

Table 2. Variable definitions and descriptive statistics

| Variable            | Variable Name          | Observations | Mean   | Std.Dev. | Min    | Median | Max    |
|---------------------|------------------------|--------------|--------|----------|--------|--------|--------|
| <i>Innovation</i>   | Corporate Innovation   | 2263         | 3.042  | 1.224    | 0.000  | 2.996  | 6.936  |
| <i>DigitalFocus</i> | Digitalization Focus   | 2247         | 0.355  | 0.508    | 0.000  | 0.145  | 3.462  |
| <i>Size</i>         | Corporate Size         | 2264         | 21.727 | 0.887    | 20.256 | 21.545 | 24.875 |
| <i>Lev</i>          | Debt-to-Asset Ratio    | 2264         | 0.269  | 0.177    | 0.052  | 0.225  | 0.747  |
| <i>ROA</i>          | Return on Total Assets | 2263         | 0.039  | 0.077    | -0.219 | 0.047  | 0.238  |
| <i>Growth</i>       | Revenue Growth Rate    | 2254         | 0.179  | 0.380    | -0.586 | 0.140  | 1.824  |
| <i>Cashflow</i>     | Cash Flow Level        | 2264         | 0.027  | 0.073    | -0.156 | 0.032  | 0.230  |
| <i>Age</i>          | Corporate Age          | 2264         | 1.332  | 0.087    | 1.125  | 1.344  | 1.516  |

## 4.2. Baseline regression results

Tab.3 shows the baseline regression results. The model looks at management digital focus and invention patent citations. STAR Market firms are in the sample. Column 1 includes only the core variable. The coefficient is 0.1584. It is not significant at the 10% level. Column 2 adds firm size and leverage. The coefficient is 0.2524. It is significant at the 1% level. This gives preliminary support for Hypothesis H1. We add more control variables. These are return on total assets, revenue growth rate, cash flow ratio, and corporate age. The independent variable stays significant at the 1% level. The baseline results do not suffer from omitted variable bias.

Table 3. Baseline regression results

| Variables          | (1)                | (2)                   | (3)                   | (4)                   |
|--------------------|--------------------|-----------------------|-----------------------|-----------------------|
| digital_density    | 0.1584<br>(0.1013) | 0.2524***<br>(0.0863) | 0.2401***<br>(0.0869) | 0.2373***<br>(0.0872) |
| Size               |                    | 0.7387***<br>(0.0438) | 0.7458***<br>(0.0440) | 0.7412***<br>(0.0446) |
| Lev                |                    | 0.6534***<br>(0.2326) | 0.6094**<br>(0.2410)  | 0.6360***<br>(0.2402) |
| ROA                |                    |                       | -0.5031<br>(0.5048)   | -0.2467<br>(0.5395)   |
| Growth             |                    |                       | -0.0911<br>(0.0578)   | -0.1059*<br>(0.0586)  |
| Cashflow           |                    |                       |                       | -0.2273<br>(0.4402)   |
| Age                |                    |                       |                       | -0.3068<br>(0.4405)   |
| Size               | 2247               | 2247                  | 2238                  | 2238                  |
| Adj.R <sup>2</sup> | 0.099              | 0.385                 | 0.382                 | 0.382                 |

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Column 4 is the fullest specification. The coefficient is 0.2373 ( $p < 0.01$ ). The result shows a positive link between digital focus and innovation.

## 4.3. Robustness tests

We check the reliability of the benchmark results. We run three robustness tests.

### 4.3.1. Sample adjustment

We change the truncation method. We remove the influence of outliers. The baseline model uses 1% quantile truncation. We replace it with 5% quantile truncation. Column 1 of Tab.4 shows the result. The coefficient is 0.2344. It is positive and significant at the 1% level. The baseline result is robust to this change. Management digital focus has a positive impact on innovation.

### 4.3.2. Replacing the dependent variable

Corporate innovation has many measures. Firms sometimes put resources into several patent types. We use a different dependent variable. It is the logarithm of total patent applications. Column 2 of Tab.4 shows the result. The coefficient is 0.2058. It is positive and significant at the 1% level. The explanatory variable keeps its positive significance. Management digital focus robustly pushes innovation. This holds for different innovation measures.

### 4.3.3. Employing an alternative estimation method

Industry fixed effects cannot capture all cross-sectional information. Management digital focus varies across firms. Founders differ in education and entrepreneurial experience. Corporate culture differs. A fixed-effects model may underestimate the true effect. It strictly controls cross-sectional variation. We use a random-effects model. Column 3 of Tab.4 shows the result. The coefficient is 0.3323. It is positive and significant at the 1% level. The explanatory variable keeps its positive significance. The positive impact of digital focus holds across model specifications.

Table 4. Robustness test results

| Variables          | (1)                   | (2)                   | (3)                   |
|--------------------|-----------------------|-----------------------|-----------------------|
|                    | ln_invention          | ln_total              | ln_invention          |
| digital_density    | 0.2344***<br>(0.0866) | 0.2058**<br>(0.0878)  | 0.3323***<br>(0.0783) |
| Size               | 0.8222***<br>(0.0528) | 0.6851***<br>(0.0426) | 0.6793***<br>(0.0467) |
| Lev                | 0.6642***<br>(0.2498) | 0.9823***<br>(0.2266) | 0.3413*<br>(0.2048)   |
| ROA                | -0.8585<br>(0.6656)   | 0.0696<br>(0.5346)    | -0.7621*<br>(0.4331)  |
| Growth             | -0.0675<br>(0.0814)   | -0.1513**<br>(0.0590) | -0.0750*<br>(0.0397)  |
| Cashflow           | 0.1461<br>(0.5070)    | 0.2937<br>(0.4264)    | -0.2995<br>(0.2994)   |
| Age                | -0.2341<br>(0.4738)   | -0.1303<br>(0.4190)   | -0.2841<br>(0.4492)   |
| Size               | 2238                  | 2238                  | 2238                  |
| Adj.R <sup>2</sup> | 0.372                 | 0.431                 | 0.066                 |

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 4.4. Heterogeneity analysis

### 4.4.1. Ownership type heterogeneity

Ownership structure shapes innovation strategies and behaviors. We split the sample into two groups. State-controlled firms are coded 1. Non-state-controlled firms are coded 0. We run separate

regressions. Columns 1 and 2 of Tab.5 show the results.

The coefficient for state-owned firms is 0.2988. The coefficient for non-state-owned firms is 0.2175. Both are positive and significant at the 10% level. Digital focus promotes innovation more in state-owned firms.

A likely reason is resource advantage. Innovation needs sustained investment in capital and talent. State-owned firms have more stable funding. They have a more committed workforce. Management signals a digital strategy in annual reports. State-owned firms can quickly move resources to carry it out. Private firms often face resource limits. They meet greater resistance to innovation.

#### 4.4.2. Regional heterogeneity

We group regions by economic development level. High-development regions get a code 1. These are Beijing, Shanghai, Jiangsu, Zhejiang, Guangdong, Fujian, and Shandong. Other regions get a code 0. We run separate regressions. Columns 3 and 4 of Tab.5 show the results.

The coefficient for developed regions is 0.1928. The coefficient for other regions is 0.4760. Both are positive and significant at the 5% level. Digital focus promotes innovation more in less developed regions.

This seems counterintuitive. Two factors can explain it. One factor is diminishing marginal returns. Firms in developed regions already have a solid digital base. Management talk about digitalization is routine. Extra digital focus adds little. Firms in other regions show digital focus in annual reports. This signals a real strategic shift. It drives innovation strongly. Another factor is the competitive landscape. Competition in developed regions is very homogeneous. Digital focus alone cannot create a competitive edge. Other regions have more room for innovation. Firms that digitalize early can attract talent and capital. They gain first-mover advantages.

Table 5. Heterogeneity test results

| Variables       | (1)                    | (2)                        | (3)                   | (4)                   |
|-----------------|------------------------|----------------------------|-----------------------|-----------------------|
|                 | State-Owned Corporates | Non-State-Owned Corporates | Developed Regions     | Other Regions         |
| digital_density | 0.2988*<br>(0.1698)    | 0.2175**<br>(0.0968)       | 0.1928**<br>(0.0896)  | 0.4760**<br>(0.2198)  |
| Size            | 0.7107***<br>(0.1591)  | 0.7312***<br>(0.0510)      | 0.7503***<br>(0.0528) | 0.7735***<br>(0.0759) |
| Lev             | 0.5444<br>(1.0908)     | 0.6394**<br>(0.2488)       | 0.5124**<br>(0.2598)  | 0.7677<br>(0.6082)    |
| ROA             | 4.4066<br>(3.6364)     | -0.4153<br>(0.5482)        | -0.4872<br>(0.5788)   | 1.1275<br>(1.2546)    |
| Growth          | -0.2633<br>(0.3158)    | -0.1080*<br>(0.0605)       | -0.0798<br>(0.0656)   | -0.1741<br>(0.1276)   |
| Cashflow        | 0.7121<br>(1.5935)     | -0.2470<br>(0.4641)        | -0.3122<br>(0.4948)   | 0.4547<br>(0.9528)    |
| Age             | -1.6474<br>(1.5445)    | -0.2758<br>(0.4717)        | -0.2497<br>(0.4729)   | 0.0035<br>(1.1542)    |
| Size            | 193                    | 2045                       | 1766                  | 472                   |

Table 5. (continued)

|                    |       |       |       |       |
|--------------------|-------|-------|-------|-------|
| Adj.R <sup>2</sup> | 0.505 | 0.351 | 0.378 | 0.457 |
|--------------------|-------|-------|-------|-------|

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 5. Conclusions and recommendations

Stronger management digital focus goes with more invention patent filings. The sample is STAR Market firms. We use a two-way fixed-effects model with industry and year. Management digital focus shows a positive link with invention patent applications.

We run robustness tests. We trim at the 5% level. We replace the dependent variable with total patent applications. We switch to a random-effects model. The finding stays robust. A strategic push on digitalization creates innovation gains. It improves operational efficiency. It speeds up digitalization. It attracts digital talent.

Heterogeneity analysis shows differences. The effect is stronger for state-owned firms than for private firms. State-owned firms have stronger resource allocation ability. Firms in less developed regions gain a bigger marginal effect. This pattern reflects competitive landscape differences and diminishing marginal returns.

We make some recommendations. At the corporate level, STAR Market firms should treat digitalization as a strategic priority. They should fully disclose digital strategies and progress in annual reports. They should turn management digital focus into real resource allocation and talent recruitment. Disclosure should go beyond formality. Private firms should move past signaling commitment. They should actively solve financing and talent bottlenecks. This turns commitment into real innovation outputs.

At the policy level, digital strategy disclosure quality could be part of STAR Market listing rules. This encourages real digital–innovation integration. Policymakers should look at regional and ownership gaps in digital dividends. They should steer infrastructure and support to less developed regions and private firms. This can raise digital capabilities across all firms.

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