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# *The Inhibitory Effect of China National Big Data Comprehensive Pilot Zones on Managerial Myopia: A Difference-in-Differences Test Based on A-Share Listed Companies*

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***Abstract.*** This study takes the phased establishment of China National Big Data Comprehensive Pilot Zones as an exogenous policy shock. Based on panel data of A-share listed companies from 2011 to 2022, it constructs a multi-period difference-in-differences model to deeply examine the impact of digital economy development on managerial myopic decision-making. The empirical results show that the establishment of big data pilot zones can effectively inhibit the short-sighted tendency of enterprise management, and this governance effect is more pronounced in larger enterprises. This paper not only enriches research at the intersection of digital economy and corporate governance, but also provides new empirical evidence for evaluating the micro governance effectiveness of macro big data policies.

***Keywords:*** China National Big Data Comprehensive Pilot Zones, managerial myopia, difference-in-differences, corporate governance

## 1. Introduction

Managerial myopia, the decision-making tendency to sacrifice long-term corporate value to achieve short-term operational goals, is one of the core issues in the field of corporate governance. Such behavior not only impairs the long-term development capacity of enterprises, but also infringes on the legitimate rights and interests of shareholders and other stakeholders. How to effectively restrain such short-sighted impulse has long been the focus of theoretical researchers and corporate practitioners. In recent years, with the vigorous development of the digital economy, emerging technologies such as big data and artificial intelligence have profoundly changed the way information is produced, disseminated and acquired, offering new possibilities for resolving information asymmetry in agency problems.

Against this background, the National Development and Reform Commission of China has established China National Big Data Comprehensive Pilot Zones (hereinafter referred to as "pilot zones") in batches since 2015, aiming to advance the in-depth integration of digital technologies and the real economy through data resource integration, open sharing and industrial agglomeration. This

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policy shock provides a suitable scenario for quasi-natural experimental research to identify the micro governance effects of digital economy development. This study aims to explore whether the external policy shock of pilot zone establishment has curbed the short-sighted behavior of enterprise management.

To answer the above question, this paper first reviews relevant literature and finds that existing studies mostly discuss the governance of managerial myopia from the perspective of traditional corporate governance mechanisms or macroeconomic policies, while research directly linking big data policies to corporate management decision-making remains insufficient. On the basis of theoretical analysis, this paper proposes research hypotheses, applies the difference-in-differences model, and conducts empirical tests based on 2011–2022 panel data of A-share listed companies. The study finds that the establishment of pilot zones significantly reduces the degree of managerial myopia, and this conclusion holds steady after multiple robustness tests including variable standardization, reduction of control variables, adjustment of clustering levels, change of time windows, and replacement of fixed effects. Heterogeneity analysis shows that this inhibitory effect is more prominent in large-scale enterprises. Finally, this paper summarizes the research conclusions, limitations and future prospects. The overall structure of the paper is as follows: Section 1 is literature review; Section 2 is theoretical analysis and research hypotheses; Section 3 is research design; Section 4 is empirical result analysis; Section 5 is conclusion and outlook.

## 2. Literature review

Existing research mainly forms two strands around this topic. The first focuses on exploring the macro and micro effects of the digital economy or big data policies. For example, the construction of China's national big data comprehensive pilot zones can significantly boost regional total factor productivity, and this positive promotion effect is mainly driven by pure technological progress [1]. The second centers on the inducing mechanism and governance strategies of managerial myopia: information asymmetry is the deep root of short-termism, and the advancement of the digital economy can prevent and correct such behavior by optimizing the corporate information transmission environment [2]. In addition, academia has also explored restraint mechanisms for short-sighted behavior from multiple perspectives such as internal control, external audit and institutional investor shareholding [3, 4].

In comparison, the first strand of research mainly stays at the macro regional level and fails to delve into micro management decision-making within enterprises [1]; while the second strand directly links the digital economy with short-sighted behavior, its measurement mainly relies on internet penetration and digital financial inclusion indices, which more reflect broad "digital ecosystem" characteristics [2]. The marginal contribution of this paper lies in selecting a clear and exogenous national policy shock in China — the big data comprehensive pilot zones — as a quasi-natural experiment, and directly linking macro policy implementation with corporate micro governance behavior through a more rigorous difference-in-differences framework. This approach effectively alleviates potential endogeneity problems and seeks to fill the research gap regarding how China's national big data industrial policy specifically acts on the internal decision-making process of enterprises.

## 3. Theoretical analysis and research hypothesis

Following the logic of principal-agent theory, the separation of ownership and control in modern enterprises directly gives rise to interest tension between management and shareholders. Driven by

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personal interests such as compensation, career reputation or promotion, management tends to choose projects with fast investment returns but low comprehensive net present value, and may even cut or abandon R&D investment, brand building and human capital development that benefit long-term value enhancement, thus giving rise to short-termism. The root of this behavior lies in the asymmetric distribution of information: management holds private information about the current operating status and real prospects of the enterprise, while external shareholders and supervisors struggle to fully obtain and verify such information.

The implementation of China National Big Data Comprehensive Pilot Zones relies on the cultivation and in-depth application of big data industrial clusters within the region, which may exert an inhibitory effect on short-sighted behavior through two core channels.

Channel 1: The construction of pilot zones strengthens data collection, intelligent processing and analysis capabilities, enabling external supervision mechanisms to detect abnormal signs of internal enterprise operations more keenly and accurately. For example, when management tries to whitewash current earnings by temporarily cutting R&D funds, the penetrating monitoring enabled by big data will significantly increase the probability of such short-sighted behavior being exposed. The resulting reputation loss, salary penalties and even legal accountability will greatly raise the marginal cost of opportunistic behavior by management, thus serving as a strong deterrent.

Channel 2: The in-depth application of big data technology also helps improve the capital market's ability to comprehensively evaluate the true intrinsic value of listed enterprises. By effectively deconstructing and analyzing unstructured financial information, the market may reduce its excessive reliance on short-term accounting profit indicators. This helps ease the short-term performance assessment pressure on management, so that they do not have to sacrifice long-term strategic investment for quarterly or annual market value performance, and can instead focus more calmly on creating long-term enterprise value.

Based on the above theoretical deduction, this paper proposes the core hypothesis to be tested:

H1: When other conditions remain unchanged, the establishment of pilot zones is expected to significantly inhibit the short-sighted behavior of enterprise management.

## 4. Research design

### 4.1. Sample selection and data sources

This paper selects Chinese A-share listed companies from 2011 to 2022 as the initial research sample. The samples are processed as follows: companies in the financial industry are excluded; ST and *ST companies are excluded; samples with missing main variable data are excluded; to eliminate the influence of extreme values, all continuous variables are winsorized at the upper and lower 1% quantiles. Finally, an unbalanced panel dataset containing more than 40,000 firm-year observations is obtained. Financial data and corporate governance data come from the CSMAR database, and policy information on big data pilot zones is manually compiled according to the list released by the National Development and Reform Commission.

### 4.2. Variable definition

#### 4.2.1. Explained variable

Managerial myopia (Myopia1). Referring to relevant literature, this paper uses real earnings management as the proxy variable for managerial myopia [2]. Real earnings management

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manipulates profits by constructing abnormal operating activities; it is more concealed and better reflects management's short-sighted tendency to sacrifice long-term interests. The calculation process strictly follows Roychowdhury's model and takes the absolute value [5]. In the robustness test, this variable is standardized using the z-score method.

Managerial myopia (Myopia2): Drawing on the research of Hu Nan et al., text analysis and machine learning technologies are used to capture words with short-term horizon characteristics from the "Management Discussion and Analysis" (MD&A) section of listed companies' annual reports [6]. The word set includes 43 terms in total: direct short-term expressions such as "within days", "within the year", "months", "immediately", "as soon as possible", "right away", and indirect terms reflecting short-term concerns such as "opportunity", "pressure", "at the time of", "test". On this basis, the proportion of the total frequency of the word set relative to the total word count of MD&A is calculated and multiplied by 100 to construct the managerial short-termism index. A higher index value indicates a stronger short-sighted decision-making tendency among managers.

### 4.2.2. Core explanatory variable

The core explanatory variable of this paper is the difference-in-differences estimator (DID), formed by multiplying the policy dummy variable (Treat) and the time dummy variable (Post), that is, the interaction term $did_{it} = Treat_i \times Post_t$. Among them, Treat indicates whether the province where the enterprise is registered has been designated as a China National Big Data Comprehensive Pilot Zone, taking a value of 1 if yes and 0 otherwise. Given that pilot zones are approved in batches (Guizhou Province in 2015, other provinces in 2016), this paper adopts the generalized DID setting and defines Post as 1 for the year when the province where the enterprise is located is approved to establish the pilot zone and all subsequent years, and 0 for other years.

### 4.2.3. Control variables

To alleviate omitted variable bias, and referring to Zhang Jiawei et al., Qiu Zixun and Zhou Yahong, as well as mainstream corporate governance literature [1-4], this paper selects the following firm-level characteristics as control variables: firm size (Size), financial leverage (Lev), growth (Growth), profitability (ROA), shareholding ratio of the largest shareholder (Top1), duality of chairman and general manager (Dual), proportion of independent directors (Indep), and firm age (FirmAge).

## 4.3. Model specification

To test the impact of big data pilot zone establishment on managerial myopia, this paper constructs the following two-way fixed effects difference-in-differences model:

$$Myopia1_{it} = \beta_0 + \beta_1 did_{it} + \gamma Controls_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Where $Myopia1_{it}$ is the degree of managerial myopia of firm i in year t; the core explanatory variable $did_{it}$ is the policy dummy variable, defined as $did_{it} = 1$ if the firm is affected by the policy in year t, and $did_{it} = 0$ otherwise. Its coefficient $\beta_1$ is the policy treatment effect of interest. If $\beta_1$ is significantly negative, it indicates that pilot zone establishment inhibits managerial myopia, supporting hypothesis H1; $Controls_{it}$ is a set of control variables; $\mu_i$ is the firm fixed effect, used to control all time-invariant firm characteristics; $\lambda_t$ is the year fixed effect, used to control the macro time trend common to all enterprises; $\varepsilon_{it}$ is the random error term. To avoid intra-group autocorrelation, standard errors for all regressions are clustered at the firm level.

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## 5. Empirical results and analysis

### 5.1. Descriptive statistics and baseline regression

Table 1 shows that the mean value of the managerial myopia index (Myopia1) is 0.029 with a standard deviation of 0.065, indicating considerable variation in the degree of myopia across enterprises. The mean value of the core explanatory variable did is 0.293, meaning approximately 35.4% of the sample falls into the post-policy treatment group period.

Table 1. Descriptive statistics

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| VARIABLES | mean | sd | min | p50 | max | N |
| did | 0.293 | 0.455 | 0.000 | 0.000 | 1.000 | 49,193.000 |
| Myopia1 | 0.029 | 0.065 | 0.000 | 0.001 | 0.497 | 45,178.000 |
| Myopia2 | 0.041 | 0.039 | 0.000 | 0.032 | 0.707 | 46,817.000 |
| Size | 22.181 | 1.301 | 19.916 | 21.978 | 26.079 | 49,193.000 |
| Lev | 0.418 | 0.208 | 0.055 | 0.409 | 0.890 | 49,193.000 |
| ROA | 0.038 | 0.064 | -0.207 | 0.038 | 0.207 | 49,193.000 |
| Growth | 0.136 | 0.337 | -0.526 | 0.090 | 1.740 | 49,193.000 |
| Indep | 37.659 | 5.370 | 25.000 | 36.360 | 60.000 | 48,322.000 |
| Dual | 0.292 | 0.455 | 0.000 | 0.000 | 1.000 | 49,193.000 |
| Top1 | 0.339 | 0.149 | 0.074 | 0.316 | 0.758 | 49,161.000 |
| FirmAge | 2.933 | 0.358 | 1.099 | 2.996 | 3.664 | 49,175.000 |

The results in Table 2 show that after controlling for firm and year fixed effects as well as all control variables, the coefficient of the core explanatory variable did is -0.011, significant at the 1% level. This result carries important economic meaning: pilot zone establishment reduces the degree of managerial myopia in treatment group firms by an average of 0.169 standard deviations relative to the control group. Given that the explained variable is standardized, this marginal effect is economically significant and strongly supports research hypothesis H1 — that the establishment of China's national big data pilot zones significantly inhibits the short-sighted behavior of enterprise management.

Table 2. Baseline regression results

| | (1) |
|---|---|
| VARIABLES | Myopia1 |
| did | -0.011*** |
| | (-6.55) |
| Size | 0.005*** |
| | (4.88) |

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Table 2. (continued)

| | |
|---|---|
| Lev | -0.029*** |
| | (-7.49) |
| ROA | 0.009 |
| | (1.09) |
| Growth | 0.004*** |
| | (4.48) |
| Top1 | -0.011* |
| | (-1.90) |
| Indep | -0.000 |
| | (-0.04) |
| Dual | -0.000 |
| | (-0.25) |
| FirmAge | 0.030*** |
| | (5.01) |
| Constant | -0.149*** |
| | (-5.40) |
| Observations | 43,992 |
| Adjusted R-squared | 0.504 |
| FIRM | YES |
| YEAR | YES |

Note: ***, ** and * represent significance levels of 1%, 5% and 10%, respectively.

## 5.2. Robustness tests

### 5.2.1. Variable standardization

The explained variable (Myopia1) is standardized using the z-score method. The results in Table 3 show a did coefficient of -0.169 ($p<0.01$), confirming the robustness of the conclusion.

Table 3. Robustness test: variable standardization

| | (1) |
|---|---|
| | Standardized: z_Myopia1 |
| did | -0.169*** |
| | (0.026) |
| Size | 0.074*** |
| | (0.015) |

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Table 3. (continued)

| | |
|---|---|
| Lev | -0.447*** |
| | (0.060) |
| ROA | 0.131 |
| | (0.120) |
| Growth | 0.068*** |
| | (0.015) |
| Top1 | -0.172* |
| | (0.091) |
| Indep | -0.000 |
| | (0.001) |
| Dual | -0.004 |
| | (0.017) |
| FirmAge | 0.464*** |
| | (0.093) |
| _cons | -2.732*** |
| | (0.423) |
| *N* | 43992 |
| adj. $R^2$ | 0.504 |
| FIRM | YES |
| YEAR | YES |

Note: ***, ** and * represent significance levels of 1%, 5% and 10%, respectively.

### 5.2.2. Reduction of control variables

Only four core control variables — Size, Lev, ROA and Growth — are retained. The results in Table 4 show a did coefficient of -0.011 ($p<0.01$), and the conclusion remains robust.

Table 4. Robustness test: reduction of control variables

| | (1) |
|---|---|
| | Simplified control variables |
| did | -0.011*** |
| | (0.002) |
| Size | 0.005*** |
| | (0.001) |
| Lev | -0.027*** |

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Table 4. (continued)

| | |
|---|---|
| | (0.004) |
| ROA | 0.006 |
| | (0.008) |
| Growth | 0.004*** |
| | (0.001) |
| _cons | -0.069*** |
| | (0.021) |
| *N* | 44828 |
| adj. $R^2$ | 0.509 |
| FIRM | YES |
| YEAR | YES |

Note: ***, ** and * represent significance levels of 1%, 5% and 10%, respectively.

### 5.2.3. Adjustment of clustering level

Standard errors are clustered at the city level, and double-clustered at both the firm and city levels. The results in Table 5 show that the did coefficients are all significantly negative at the 1% level, indicating that the conclusion is not affected by the clustering method.

Table 5. Robustness test: adjustment of clustering level

| | (1) | (2) |
|---|---|---|
| | City clustering | Double clustering |
| did | -0.011*** | -0.011*** |
| | (0.002) | (0.002) |
| Size | 0.005*** | 0.005*** |
| | (0.001) | (0.001) |
| Lev | -0.029*** | -0.029*** |
| | (0.005) | (0.005) |
| ROA | 0.009 | 0.009 |
| | (0.011) | (0.011) |
| Growth | 0.004*** | 0.004*** |
| | (0.001) | (0.001) |

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Table 5. (continued)

| | | |
|---|---|---|
| Top1 | -0.011** | -0.011** |
| | (0.005) | (0.005) |
| Indep | -0.000 | -0.000 |
| | (0.000) | (0.000) |
| Dual | -0.000 | -0.000 |
| | (0.001) | (0.001) |
| FirmAge | 0.030*** | 0.030*** |
| | (0.006) | (0.006) |
| _cons | -0.149*** | -0.149*** |
| | (0.034) | (0.034) |
| *N* | 43992 | 43992 |
| adj. $R^2$ | 0.504 | 0.504 |
| FIRM | YES | YES |
| YEAR | YES | YES |

Note: ***, ** and * represent significance levels of 1%, 5% and 10%, respectively.

### 5.2.4. Adjustment of time window

The sample period is restricted to 7 years before and after the intensive policy implementation phase. The results in Table 6 show a did coefficient of -0.014 ($p<0.01$), and the conclusion remains robust.

Table 6. Robustness test: adjustment of time window

| | (1) |
|---|---|
| did | -0.014*** |
| | (0.002) |
| Size | 0.009*** |
| | (0.002) |
| Lev | -0.028*** |
| | (0.006) |

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Table 6. (continued)

| | |
|---|---|
| ROA | 0.020** |
| | (0.009) |
| Growth | 0.004*** |
| | (0.001) |
| Top1 | -0.005 |
| | (0.009) |
| Indep | -0.000 |
| | (0.000) |
| Dual | -0.002 |
| | (0.002) |
| FirmAge | 0.070*** |
| | (0.017) |
| _cons | -0.367*** |
| | (0.062) |
| *N* | 24317 |
| adj. $R^2$ | 0.490 |
| FIRM | YES |
| YEAR | YES |

Note: ***, ** and * represent significance levels of 1%, 5% and 10%, respectively.

### 5.2.5. Replacement of fixed effects

Firm fixed effects in the baseline model are replaced with industry fixed effects. The results in Table 7 show a did coefficient of -0.019 ($p<0.01$), and the conclusion remains robust.

Table 7. Robustness test: replacement of fixed effects

| | (1) |
|---|---|
| | Industry FE |
| did | -0.019*** |
| | (0.001) |

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Table 7. (continued)

| | |
|---|---|
| Size | 0.001*** |
| | (0.001) |
| Lev | -0.069*** |
| | (0.004) |
| ROA | 0.058*** |
| | (0.010) |
| Growth | 0.002 |
| | (0.001) |
| Top1 | 0.005 |
| | (0.004) |
| Indep | 0.000 |
| | (0.000) |
| Dual | 0.004*** |
| | (0.001) |
| FirmAge | 0.003* |
| | (0.002) |
| _cons | 0.012 |
| | (0.013) |
| *N* | 44349 |
| adj. $R^2$ | 0.110 |
| FIRM | NO |
| YEAR | YES |
| INDUSTRY | YES |

Note: ***, ** and * represent significance levels of 1%, 5% and 10%, respectively.

The above series of tests collectively demonstrate that the baseline regression results of this paper are robust and reliable, and the inhibitory effect of big data pilot zones on managerial myopia is real.

### 5.3. Heterogeneity analysis: the moderating role of firm size

Large and small enterprises differ significantly in resource endowment, management standardization and external attention, which may lead to heterogeneity in the policy effects of pilot zones. This paper further examines the moderating effect of firm size (Size). Specifically, the sample is divided into a large-scale enterprise group and a small-scale enterprise group based on the median of firm size, and interaction terms are constructed for regression.

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Table 8. Heterogeneity analysis: the moderating role of firm size

| | (1) |
|---|---|
| | Firm size |
| did | -0.007*** |
| | (0.002) |
| 1.Large | 0.007*** |
| | (0.002) |
| 1.Large#c.did | -0.006*** |
| | (0.002) |
| Size | 0.003*** |
| | (0.001) |
| Lev | -0.030*** |
| | (0.004) |
| ROA | 0.009 |
| | (0.008) |
| Growth | 0.004*** |
| | (0.001) |
| Top1 | -0.011* |
| | (0.006) |
| Indep | 0.000 |
| | (0.000) |
| Dual | -0.000 |
| | (0.001) |
| FirmAge | 0.029*** |
| | (0.006) |
| _cons | -0.113*** |
| | (0.029) |
| *N* | 43992 |
| adj. $R^2$ | 0.505 |

Note: ***, ** and * represent significance levels of 1%, 5% and 10%, respectively.

The results in Table 8 show that the coefficient of the interaction term 1.Large#c.did is -0.006, significant at the 1% level. This indicates that compared with small-scale enterprises, pilot zone establishment exerts a more significant inhibitory effect on managerial short-sighted behavior in large-scale enterprises. One plausible economic explanation is that large-scale enterprises usually have more complex businesses and more opaque information, with more acute principal-agent

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problems, yet they are also the focus of external supervisors such as analysts and media. The big data technology empowerment brought by pilot zones enables external supervision to penetrate the complex information structure of large enterprises more efficiently, thereby producing a more pronounced governance effect.

## 6. Conclusion and outlook

Taking the establishment of China National Big Data Comprehensive Pilot Zones as an exogenous policy shock, this paper empirically examines the intervention effect of macro big data policies on the short-sighted behavior of micro enterprise management by constructing a multi-period difference-in-differences model using 2011–2022 panel data of A-share listed companies. The study finds that the establishment of big data pilot zones significantly reduces the degree of managerial myopia, and this inhibitory effect remains robust after a series of rigorous robustness tests. Heterogeneity analysis further shows that this governance effect is more prominent for large-scale enterprises. Grounded in the perspective of micro enterprise decision-making, this study confirms the positive governance effect of China's national big data industrial policy, and also provides new evidence for theoretical discussions at the intersection of digitalization policy and corporate governance.

This study has certain limitations. First, the sample is limited to A-share listed companies, and whether the conclusions apply to non-listed companies or other economies remains to be further tested. Second, constrained by data availability, this paper only depicts managerial myopia from the dimension of real earnings management; future research can attempt richer measurement methods. Future studies can also further explore the specific mechanism through which big data pilot zones inhibit managerial myopia.

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