

The Impact of Digital Government Construction on Cross-region Investment: Evidence from China

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ABSTRACT This study uses a difference-in-differences framework and firm-level data from Chinese listed companies to investigate the effect of digital government construction on cross-regional investment. Big data management institutional reform is treated as an exogenous policy shock to identify the causal relationship between digital government construction and firms' cross-regional investment behavior. The results show that digital government construction has a significant positive effect on cross-regional investment. Mechanism tests indicate that digital government construction promotes cross-regional investment by reducing firms' external transaction costs and debt financing costs. Further analysis reveals heterogeneous effects across regions, industries, and firms. The promotion effect differs according to local government tax dependence, industry competition intensity, and corporate governance structure, such as whether the chairman concurrently serves as general manager. Robustness checks, including parallel trend testing, placebo testing, and controls for other policy interventions, support the reliability of the conclusions. The findings provide empirical evidence for advancing digital government construction and improving capital factor mobility within a national unified market.

INDEX TERMS digital government, cross-region investment, national unified market, difference-in-differences, firm-level data

I. INTRODUCTION

THE current international economic landscape presents a complex mix of opportunities and challenges. First, there is both growth and widening divergence: developed economies are experiencing sluggish growth, while emerging markets are developing relatively well. Second, the global economy faces multiple uncertainties, such as trade protectionism, geopolitical conflicts, and policy adjustments, which hinder international economic cooperation. China is the world's largest market and still holds enormous development potential. This is not only a key advantage for China's own development, but also a crucial pillar for maintaining stability and addressing challenges amid profound global transformations. Establishing an efficient, well-regulated, fair-competition, and fully open national unified market contributes to optimal resource allocation, promotes regional innovation, fosters industrial synergistic development and drives economic growth [1]. On January 7, 2025, the Guidelines for Building a National Unified Market (Trial) was released. This pivotal document guides all regions and departments to accelerate their integration into and proactive contribution to a national unified market. The 15th Five-Year Plan emphasizes advancing market-oriented reforms of production factors and establishing a

unified market for factors and resources. Cross-regional corporate investment is regarded as the micro-foundation for the flow of capital elements [2]. Hence, facilitating cross-regional investment and enhancing the fluidity of capital factors constitute essential imperatives for the advancement of an integrated national market.

The extant scholarly discourse identifies the proper calibration of government-market relations as the central challenge in establishing a unified national market [3], requiring both "effective market" and "capable government" in resource allocation. Chinese enterprises' cross-regional investment has achieved remarkable accomplishments, with registered subsidiaries increasing from first exceeding 100 in 1978 to surpassing 240,000 in 2020. This success would not have been possible without the robust policy measures adopted by the Chinese government. In recent years, regional integration policies, tax incentive policies, environmental regulation policies, and industrial policies implemented by China have all played a positive role in alleviating market segmentation and effectively breaking down barriers to factor mobility, thereby promoting corporate cross-regional investment. At present, the efficiency of capital allocation within China still requires further improvement [4]. First, there are notable interregional disparities:

the eastern region, being economically developed, possesses a large capital stock and relatively active capital flows, primarily within the region itself. In contrast, the central and western regions of China have relatively lagged in economic development. Second, while the activity of cross-regional corporate investment has increased, it still faces certain challenges, such as the need to enhance synergies among subsidiaries. Currently, digitalization, networking, and intelligent development have become global trends. Particularly in terms of capital allocation, digital government theoretically can promote the construction of a unified national market by facilitating large-scale flow of production factors [5]. Therefore, at the micro level, whether digital government development can effectively support cross-regional investment by enterprises and foster the mobility of capital elements requires further empirical examination.

The development of digital government should be grounded in public policy. The Guidelines for Building a Unified National Market (Trial) proposes, from the perspective of “encouraging action,” that “regions with adequate conditions may take the lead in piloting reforms, accelerate the construction of local and cross-regional unified markets by benchmarking higher standards.” China has implemented a series of policy instruments, including the National Information Benefiting-the-People Pilot Program, Smart City initiatives, and the Broadband China strategy. With the establishment of the Big Data Administration Bureau in Guangdong in 2014 serving as the prelude, China has commenced the big data management institutional reform. As of January 2024, among the 34 provincial-level administrative regions nationwide, 30 administrative units have established this institutions. Big data management institutions have conducted work encompassing data resource management, data infrastructure construction, cultivation of data factor markets, and data security assurance. Building on this policy, scholars have carried out a series of quasi-natural experiments, with research demonstrating that the reform of big data management institutions can, at micro level, promote enterprise digital transformation and curb corporate R&D manipulation. Nevertheless, its relationship with cross-regional capital mobility remains unexplored.

Building upon the preceding analysis and established literature, the study focuses on the following questions: Can digital government development effectively promote cross-regional corporate investment? If so, what are the underlying mechanisms? Are there heterogeneous effects? This research contributes to the scholarly discourse by elucidating, from a theoretical standpoint, how digital government evolution shapes corporate cross-regional investment in the digital economy era, while simultaneously advancing the literature on interregional economic linkages.

II. LITERATURE REVIEW

Cross-regional enterprise investment refers to investment activities where firms cross geographical boundaries to invest in areas beyond their parent company’s registered lo-

cation. Such investment behavior not only impacts corporate strategic positioning and resource allocation, but also bears significant implications for regional economic development, industrial relocation, and market integration. Reviewing the relevant literature reveals that studies on the determinants of domestic cross-regional investment primarily center on two dimensions: the macro-level environment and micro-level enterprise. Studies at the macro level indicate that the policies [6] and infrastructure development [7] exert a significant influence on cross-regional enterprise investment. At the micro-organizational level, extant evidence suggests that firms’ digital transformation initiatives exert a positive influence on the scale of their cross-regional investment activities [8]. Overall, cross-regional enterprise investment is a complex economic phenomenon influenced by multiple factors. With the rapid development of digital technology, determinants of cross-regional investment are continuously evolving. Future research should focus on these emerging trends to better inform policymakers and enterprises. Digital government construction refers to the comprehensive digital transformation and innovation of governmental organizational structures, operational mechanisms, service models, and management approaches, leveraging digital technologies to enhance governance capacity and administrative efficiency. Early research on digital government construction primarily focused on foundational theoretical aspects, including the conceptual definition, development strategies, and implementation approaches of digital government. Subsequently, research has gradually expanded into the field of practical application. From the perspective of enterprises, digital government construction can collaboratively enhance the level of competitiveness and reduce firms’ non-productive expenditures [9]. From a macro perspective, which has been more extensively studied, scholars argue that digital government construction can empower the optimization of urban management [10], promote urban green development [11]. However, there remains scarce research exploring the relationship between digital government construction and corporate cross-regional investment.

Based on the above analysis, existing research has primarily examined the relationship between corporate digital transformation and cross-regional investment. Whether and how government digital transformation influences corporate investment constitutes a theoretically and empirically unresolved question. Scholars have conducted quasi-natural experiments on digital government construction based on policies such as the comprehensive e-government pilot and the national information benefitting the people pilot; Nevertheless, scholarly inquiry into the investment implications of big data management institutional reform remains notably limited. Compared with existing literature, the present study contributes to the extant literature in several respects. Primarily, it augments the scholarly discourse on digital government development. Existing studies on digital government have predominantly focused on disciplines such as public administration, management information systems,

and library and information science, while there is relatively limited literature examining its impact on economic fields, particularly the economic decision-making of micro-level market entities. This study extends research on the economic effects of digital government construction from the perspective of cross-regional enterprise investment. The paper provides a novel perspective and insights for understanding the economic implications of digital government development, while offering empirical evidence on how digital government construction can empower the establishment of a nationally unified market. Second, this study expands the research content on factors influencing corporate cross-regional investment. As analyzed previously, existing literature on determinants of cross-regional investment encompasses macro, meso, and micro dimensions; however, studies specifically examining digital government construction as an influencing factor remain scarce. This paper uncovers the mechanistic pathways through which digital government construction impacts corporate cross-regional investment, thereby offering a valuable supplement to existing literature and providing reference for subsequent research. Third, the findings reveal heterogeneous policy effects across various dimensions, including the degree of local government tax dependence, the intensity of industry competition in which enterprises operate, and the presence of a dual leadership structure where the chairman concurrently serves as general manager. These results furnish both theoretical and empirical support for devising differentiated digital government construction strategies aimed at promoting cross-regional enterprise investment.

III. THEORETICAL ANALYSIS AND RESEARCH HYPOTHESES

A. POLICY BACKGROUND

In response to the rapid development of the big data era, China has introduced and implemented a series of institutional measures to optimize data resource allocation, enhance data governance capabilities, and promote the marketization of data elements, thereby gradually establishing a big data management framework that provides institutional support for economic development. In this context, the evolution of big data management institutional reform policies has progressed through a trajectory from initial exploration to comprehensive deepening, and from policy guidance to legalization and standardization. In 2014, big data was first incorporated into the Government Work Report, signifying that the national level began to emphasize the application and development of big data. In the same year, Guangdong established the Big Data Administration Bureau, becoming China's first local-level big data management agency. In 2017, the Guizhou Provincial Big Data Development Administration was established, marking the country's first provincial-level big data management agency, primarily responsible for promoting big data industry development and data resource governance. Subsequently, provinces and cities such as Zhejiang and Shenzhen successively set up

their own big data management agencies, which mainly undertake administrative oversight and industrial development functions. In March 2023, the national institutional reform plan was announced, deciding to establish the National Data Administration to coordinate the advancement of data infrastructure system development, as well as to oversee the integration, sharing, development, and utilization of data resources. At the specific implementation level, various regions have generally established unified data platforms such as "One-Network Sharing" to break down data barriers between departments. Multiple provinces have constructed a "single ledger" of provincial public data catalogs. Taking Guangdong as an example, its provincial "One-Network Sharing" platform for data resources has served over 2,342 departments and responded to 260,000 data requests. Fujian, on the other hand, has built an integrated provincial public data infrastructure, aggregating over 220 billion items of public data. Meanwhile, various regions are providing data to the public through unified open platforms. Among them, Guangdong's "Open Guangdong" platform has made over 27 billion items of public data available to the public, while the volume of data opened through relevant platforms in Shandong has also exceeded 48 billion items. In addition, many localities have launched pilot programs for the authorized operation of public data, transforming data from a "resource" into an "asset." For example, Rizhao City established a Public Data Authorized Operation Center and formed a professional operation team. Various regions have cultivated a large number of high-value application scenarios in fields such as finance, healthcare, and transportation. Based on a trusted data space, Wenzhou launched "Smart Digital Green Wave" and cross-hospital sharing of medical imaging data, among which the medical imaging data has aggregated 170 million items, helping patients reduce imaging costs by over 60%. Shandong has created 141 authorized operation scenarios and achieved significant results in the marine fishery sector.

As these policies have been progressively implemented, digital government construction have gained increasing momentum. This research employs big data management institutional reform as an exogenous policy intervention to examine the causal relationship between digital government and firms' cross-regional investment.

B. THE IMPACT OF DIGITAL GOVERNMENT CONSTRUCTION ON CORPORATE CROSS-REGIONAL INVESTMENT

Digital government influences corporate cross-regional investment through two theoretical channels: governance efficiency gains and business environment upgrades [12]. Specifically, the integration of big data and related digital technologies into administrative processes strengthens governmental effectiveness [13], which subsequently reduces barriers to corporate cross-regional expansion. The level of government governance can be measured across dimensions such as government efficiency and regulatory

quality. First, government efficiency manifests in its ability to adopt policy measures to address market failures. Promoting the interconnectivity of data infrastructure and building ubiquitous, intelligent, and agile infrastructure service capabilities constitute one of the core components of digital government construction. The digital infrastructure framework established through digital government construction enables efficient collection, analysis, and integration of socio-economic operational data. By providing precise information on economic performance, it helps enterprises rapidly and accurately access relevant data, enhances their capacity to interpret policies, and improves the transparency of business-related and enterprise-supporting policies. This effectively mitigates firms' perception of uncertainty. Such an initiative reduces the constraints imposed by geographical distance on corporate investment, thereby creating favorable conditions for cross-regional investment by enterprises. Second, it fosters a sound market environment by innovating regulatory models and enhancing regulatory quality. Big data management institutions leverage digital technologies to construct smart regulatory frameworks, improving regulatory flexibility and coordination through data sharing and collaborative oversight. The government can thereby monitor policy implementation more clearly and comprehensively, promptly identify and provide feedback on issues; simultaneously, it can accurately grasp the behaviors of regulated entities and effectively curb unfair competitive practices, thus creating a stable and predictable business environment for enterprise development.

Policy initiatives represent changes in the external environment. The external measure of digital government construction can stimulate the endogenous motivation for capital expansion within firms. The scale effect generated by a larger market size, along with supply chain matching, attracts inbound investment, stimulates corporate investment demand, and drives cross-regional investment by enterprises. Digital government construction provides both technical support and institutional safeguards for dismantling market fragmentation and expanding market scale: First, it substantially facilitates information flow and coordinated governance across regions by establishing cross-regional data-sharing platforms. Second, through policy support and strategic infrastructure deployment, it promotes the development of digital industrial clusters and fosters inter-regional industrial synergy. Third, by furnishing digital infrastructure and public service platforms, it lowers the barriers to innovation and entrepreneurship, attracts more market participants, and further expands market scale. Based on this, we propose:

H1: Digital government construction can effectively promote corporate cross-regional investment

C. THE MECHANISM OF DIGITAL GOVERNMENT CONSTRUCTION INFLUENCING CORPORATE CROSS-REGIONAL INVESTMENT

Market friction theory posits that phenomena such as information asymmetry arising from market incompleteness

increase transaction costs for resource factors, thereby hindering optimal resource allocation [14]. In practice, corporate cross-regional investment is subject to multifaceted influences, among which investment costs and expected returns constitute the primary considerations for enterprises as rational economic agents. When market friction is pronounced, substantial information barriers exist among market entities, which elevates firms' external transaction costs and debt financing expenses, consequently diminishing their propensity for cross-regional investment. Digital government construction, on the one hand, can ameliorate information asymmetry stemming from administrative obstacles, thereby reducing firms' external transaction costs; on the other hand, it facilitates unimpeded information connectivity mechanisms that enhance mutual trust among market entities, thus lowering corporate debt financing costs.

Enterprise-level external transaction costs fall into two categories: pre-contractual costs and post-contractual costs. Ex-ante costs primarily include search costs incurred when identifying trading partners, as well as negotiation and contracting costs during the agreement formation process. Ex-post costs mainly encompass monitoring expenses to ensure contract compliance and potential costs arising from counterparty default. In terms of reducing external transaction costs through digital government construction, first, such initiatives can effectively mitigate administrative barriers stemming from information asymmetry in market transactions. From a policy perspective, on one hand, in 2022, the General Office of the State Council of China issued the Guidelines for the National Integrated Government Big Data System Construction, establishing a "1+32+N" architecture with the national government big data platform serving as the core node. This initiative aims to achieve unified management of government data catalogs, unified release of resources, centralized processing of sharing requests, and integrated supply-demand matching. By 2023, it had connected 52 departments and 32 localities, with cumulative service calls exceeding 48.47 million. This reform transparently presents data resources across regions and departments, resolving information blind spots regarding what data exists and where it is located. Meanwhile, data requesters can apply for cross-departmental data through a unified portal, thereby reducing search costs. On the other hand, by improving data management institutions and clarifying the open boundaries and usage protocols of government data, digital government construction helps ensure the security and compliance of data sharing, mitigates implicit barriers to information sharing caused by data security and privacy concerns, and consequently optimizes the external environment, offering regulatory safeguards for external transactions. By leveraging open data platforms, governments can promptly release information such as policy backgrounds and implementation outcomes, which strengthens the ability of the public and enterprises to access relevant information and reduces uncertainty-related risks in external transactions. Furthermore, financing constraints also consti-

tute a factor contributing to market imperfections, acting as a key institutional barrier hindering capital flows [15]. Compared to local enterprises, cross-regional firms face greater difficulty in meeting local collateral requirements, often encounter borrowing restrictions, and consequently are subject to higher borrowing costs and stricter financing constraints, which increases the difficulty to enter local markets. Through technologies can better integrate corporate operational data, financial information, and credit records, forming standardized and structured information resources. This facilitates more accurate assessment of corporate credit risk by financial institutions, thereby reducing high financing costs. Simultaneously, the increased activity of cross-regional investment by enterprises after cost reduction will intensify market competition, and the positive feedback mechanism formed by cost-control effects can further lower corporate financing costs. Additionally, digital government construction can promote the digital transformation of enterprises, enhancing their operational efficiency and market competitiveness. By optimizing supply chain management, reducing production costs, and improving sales efficiency through digital transformation, enterprises strengthen their debt-servicing capacity and market competitiveness. Such improvements in business performance not only alleviate financial institutions' concerns about corporate debt defaults but also further reduce debt financing costs.

Based on this, we propose:

H2: Digital government construction can promote cross-regional investment by reducing external transaction costs.

H3: Digital government construction can promote cross-regional investment by reducing debt financing costs.

IV. RESEARCH DESIGN AND DATA

A. MODEL CONSTRUCTION

This study employs a multiple-period difference-in-differences (DID) framework to examine the causal effect of digital government development on cross-regional investment, as detailed below:

$$invest_{itj} = a_0 + a_1 bdmot_{itj} + a_2 control_{itj} + v_i + \mu_t + \delta_j + \epsilon_{itj}. \quad (1)$$

The dependent variable, cross-region investment ($invest_{itj}$), is indexed by firm (i), province (j), and year (t). The key explanatory variable ($bdmot_{itj}$) is a binary indicator that equals 1 if province j implemented big data management institutional reform in year t or earlier, and 0 otherwise. To account for heterogeneity across firms and provinces, we include a vector of control variables ($Control$). Parent-level controls comprise firm size ($size$), total asset growth rate ($tagr$), state ownership indicator (soe), tangible asset ratio (nta), and asset turnover ratio (atr). Province-level controls include industrial structure (ind), economic development (eco), and population size (peo). The model incorporates parent firm fixed effects (v), year fixed effects (μ), and

subsidiary province fixed effects (δ), with ϵ denoting the idiosyncratic error term.

B. VARIABLE DESIGN

Dependent Variable: The dependent variable is firms' cross-region investment ($invest$), measured by the natural logarithm of (1 + the number of cross-region subsidiaries established by a firm in a given province).

1) Independent Variable

The independent variable is Big Data Management Organization reform ($bdmo$). This dummy variable is assigned a value of 1 starting from the year when the subsidiary's province implemented the reform, and 0 before that year.

Control Variables: This study includes eight control variables.

Enterprise size ($size$): The study employs the natural logarithm of the company's total assets to measure the size of the enterprise in the region.

Total asset growth rate ($tagr$): is calculated by taking the difference between the total assets at the end of the period and the beginning of the period, and then dividing it by the total assets at the beginning of the period. **Ownership nature (soe)** is a dummy variable. If the company is state-owned, it is assigned a value of 1; otherwise, it is 0.

The tangible asset ratio (nta): The study measures the tangible asset ratio with the proportion of tangible assets to total assets.

The total asset turnover rate (atr): This article assesses the total asset turnover rate by the ratio of the company's operating revenue to the total assets at the end of the period.

Industrial structure (IND) is measured as the ratio of value-added in the tertiary (service) sector to value-added in the secondary (industrial) sector.

The economic development level (ECO) is quantified by taking the natural logarithm of (1 + the gross regional product)

Population size (PEO) is calculated by taking the natural logarithm of (1 + year-end resident population).

C. DATA SOURCES AND DESCRIPTIVE STATISTICAL ANALYSIS

The dataset encompasses A-share market listed companies spanning from 2010 to 2022. Firstly, Summarize the basic information of non-local subsidiaries disclosed in corporate annual reports by each province and organize it into a panel dataset in the format of company-year-province. Then the following samples are excluded: (1) samples belonging to ST, *ST, PT, and delisted enterprises; (2) enterprises with insolvent liabilities, enterprises in the financial industry, enterprises with missing key variables, and enterprises listed during the sample period. All continuous variables were winsorized at the 1% and 99% levels. After the above series of processing steps, 535,246 observations were obtained. The research data are sourced from the CSMAR Database,

TABLE 1. Descriptive statistics of variables

Variable	Obs	Mean	SD	Min	Max
invest	535246	0.134	0.378	0.000	1.946
bdmo	535246	0.287	0.453	0.000	1.000
size	535246	22.657	1.372	19.870	26.510
tagr	535246	0.110	0.197	-0.284	1.025
soe	535246	0.602	0.489	0.000	1.000
nta	535246	0.932	0.085	0.530	1.000
atr	535246	0.657	0.490	0.060	2.874
ind	535246	1.338	0.712	0.619	4.894
eco	535246	9.734	1.010	6.847	11.673
peo	535246	9.132	0.840	5.787	9.421

China Research Data Service Platform, and provincial statistical yearbooks. Table 1 presents the descriptive statistical analysis results of the main variables. It can be observed that approximately 28.7% of the samples were affected by the reform of big data management agencies, i.e., the treatment group, while 71.3% of the samples were not subject to intervention, i.e., the control group.

V. EMPIRICAL ANALYSIS

A. BENCHMARK REGRESSION ANALYSIS

Table 2 presents the baseline estimation results. Column (1) includes parent firm and year fixed effects without additional controls. Column (2) augments the specification with subsidiary province fixed effects. Columns

(3) and (4) sequentially introduce parent-level and province-level covariates, respectively, while retaining the full set of fixed effects. Across all specifications, the coefficient on big data management institutional reform remains positive and statistically significant at the 1% level, indicating a robust promotional effect on firms' cross-regional investment activities. Hypothesis H1 is confirmed, suggesting that the development of digital government construction provides an important driving force for promoting the cross-region Investment. Based on the analysis above, the establishment of digital government has broken down information barriers and institutional obstacles, thereby reducing investment uncertainty and encouraging enterprises to invest in the region. Under this logic, when the location of the parent company implements similar reforms in big data management agencies, the information barriers and institutional obstacles in the parent company's region are likewise alleviated. Given that corporate investment behavior objectively exhibits a local preference, it can be expected that when the parent company's location has already carried out big data management agency reforms, the attractiveness of such reforms in other regions for cross-regional investment will significantly diminish.

To examine this hypothesis, the sample was partitioned according to whether the parent firm's location had undertaken big data management institutional reform. Columns (5) and (6) of Table 2 present the effects of destination-region big data management institutional reform on cross-regional investment for subsamples where the parent company location had not yet implemented versus had already

implemented such reforms, respectively. The results show that when the parent company's location had not implemented big data management agency reforms, reforms in other regions significantly promoted enterprise investment into those regions at the 1% level. In contrast, when the parent company's location had also implemented such reforms, reforms in other regions did not attract enterprises to invest there. This finding indirectly supports Hypothesis 1.

B. ROBUSTNESS TEST

1) Parallel Trends and Placebo Tests

This study conducts a parallel trends test using an event study design. The policy implementation period is set as the baseline, with a confidence interval of 5%. Additionally, to avoid unstable estimates due to an excessive number of pre-treatment periods, periods 6–13 before implementation are merged into the fifth period prior to implementation. The parallel trends assumption would be invalidated if treatment and control groups differ significantly at the 5% level before policy implementation. and vice versa.

Figure 1 presents results of the parallel trends test. It shows that before policy implementation, the confidence interval of the estimated coefficient for cross-regional investment between the treatment and control groups straddles zero, indicating that it is not statistically significant at the 5% level; that is, no systematic difference exists, satisfying the parallel trends precondition. After policy implementation, the confidence interval lies entirely above zero, indicating that significant systematic differences in cross-regional investment emerge between the treatment and control groups. Thus, the parallel trends assumption is satisfied. Since other potential factors besides the reform of big data management agencies may also affect firms' cross-regional investment during the sample period, leading to estimation bias, we conduct a placebo test based on a falsification test approach. Specifically, we randomly construct pseudo policy shocks and re-estimate the regression to examine whether the baseline results are contaminated by confounding factors. Figure 2 presents the results of 500 random draws. The placebo estimates are approximately normally distributed around zero and far from the true estimate of 0.008, indicating that the baseline results are not driven by potential confounders and that the reform of big data management agencies does indeed promote firms' cross-regional investment.

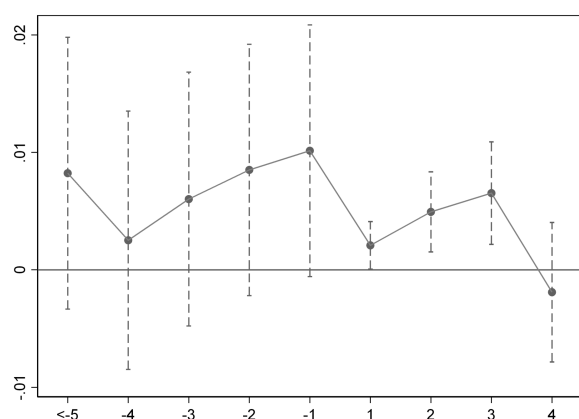
2) Controlling for other policy interventions

It should be noted that during the sample period from 2010 to 2022, policies such as VAT credit refunds, provincial-level management of court personnel and financial resources, provincial-level new urbanization pilot zones, and government data openness may also affect cross-regional corporate investment, thereby potentially confounding the estimation results. Specifically, the VAT input tax credit refund policy releases tied-up capital by returning accumulated credits to enterprises—credits that arise from mismatches in the VAT

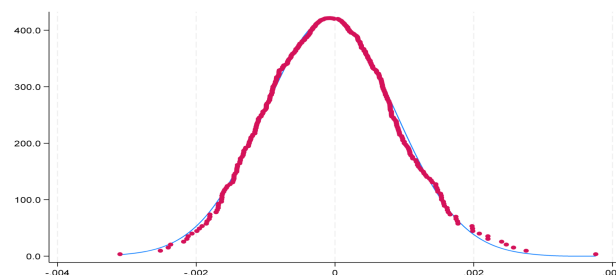
TABLE 2. Digital Government Construction and Cross-region Investment

Variable	(1) invest	(2) invest	(3) invest	(4) invest	(5) invest	(6) invest
bdmo	0.018*** (0.002)	0.012*** (0.002)	0.012*** (0.002)	0.008*** (0.002)	0.021*** (0.003)	0.001 (0.004)
size			0.078*** (0.001)	0.078*** (0.001)	0.077*** (0.002)	0.073*** (0.005)
tagr			−0.034*** (0.003)	−0.034*** (0.003)	−0.023*** (0.003)	−0.025*** (0.008)
soe			0.010*** (0.003)	0.010*** (0.003)	0.005 (0.004)	0.003 (0.008)
nta			−0.064*** (0.010)	−0.064*** (0.010)	−0.057*** (0.012)	−0.067** (0.034)
atr			−0.001 (0.002)	−0.001 (0.002)	0.003 (0.003)	−0.011* (0.006)
ind				0.051*** (0.003)	0.051*** (0.004)	0.039*** (0.015)
eco				−0.006 (0.007)	−0.006 (0.008)	0.070 (0.042)
peo				0.252*** (0.018)	0.233*** (0.024)	0.031 (0.121)
constant	0.129*** (0.001)	0.131*** (0.001)	−1.577*** (0.029)	−3.636*** (0.122)	−3.471*** (0.177)	−2.444*** (0.786)
Parent firm(FE)	YES	YES	YES	YES	YES	YES
Province(FE)	NO	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
observations	535246	535246	535246	535246	355386	165726
R^2	0.196	0.239	0.246	0.247	0.237	0.309

t statistics in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. (hereinafter the same)

**FIGURE 1.** Parallel Trends Test

deduction chain—thereby effectively alleviating endogenous financing constraints associated with capital tie-up. This mechanism not only preserves tax neutrality but also furnishes firms with financial resources for cross-regional investment activities. Moreover, the initial implementation

**FIGURE 2.** Placebo Tests

of this policy was confined to nine teen sectors, including advanced manufacturing and modern services, manifesting a distinct sector-specific orientation. Additionally, a firm's eligibility for VAT credit refunds transmits a credible signal of state support to external stakeholders, which in turn facilitates its access to convenient and low-cost external financing for cross-regional investment endeavors [16].

The provincial-level unified management reform of court personnel, finances, and assets consolidates the fiscal and personnel authority of lower-level people's courts under

provincial party and government organs. On one hand, this helps prevent local governments from interfering in judicial activities through control over operational funding and personnel appointments, thereby mitigating local judicial protectionism and creating a favorable institutional environment for enterprises to conduct cross-regional investments. On the other hand, by objectively strengthening legal protection for corporate interests and safeguarding the fairness and efficiency of judicial adjudication, this reform contributes to reducing institutional transaction costs arising from cross-regional investment activities, thus enhancing enterprises' willingness to invest across regions. The provincial new-type urbanization pilot zone policy focuses on measures such as household registration reform, strengthening equal access to basic public services, fostering regionally distinctive industrial clusters, and developing modern metropolitan areas. In effect, these initiatives serve a dual purpose: first, they reduce human capital and investment costs within the region, incentivizing enterprises to establish cross-regional subsidiaries as a means of lowering production and operational expenses to enhance profitability; second, the new urbanization drive expands the region's market potential and scale, which, in a consumer-oriented market, encourages firms to engage in cross-regional investment activities [17].

Government data openness, by publicly disclosing diverse categories of government public information, promotes transparency in local institutional frameworks. This institutional innovation not only mitigates the institutional transaction costs incurred by enterprises when navigating heterogeneous regional regulatory systems during cross-regional investment, but also strengthens governmental accountability mechanisms, thereby catalyzing enhancements in policy enforcement rigor, continuity, and applicability. Consequently, it furnishes institutional safeguards for the conduct of cross-regional investment activities.

Overall, the aforementioned policies may all exert an influence on corporate cross-regional investment behavior. To mitigate this potential confounding effect, we construct dummy variables for these policies and control for them in a stepwise manner. Table 3 reports the results after ruling out interference from other policies. Columns (1) through (4) in Table 3 present the results of progressively controlling for the aforementioned policy dummies, while Column (5) simultaneously controls for all the aforementioned policy dummies. The results show that the reform of big data management institutions consistently exhibits a positive and significant effect on corporate cross-regional investment at the 1% level, indicating that the reform indeed attracts corporate cross-regional investment rather than being driven by potential confounding effects from policies such as VAT credit refunds, provincial unified management of court personnel/finances/materials, provincial new-type urbanization pilot zones, and government data openness. This further corroborates the conclusions obtained from the baseline regression.

3) Other Robustness Tests

This study, while retaining the original fixed effects, additionally controls for the interaction term between parent firm industry and time. Moreover, given that corporate cross-regional investment activities are also influenced by time-invariant factors such as regional cultural environment and geographic distance, we fixed effects for parent-subsidiary province pairs.

In the sample data, the dependent variable contains approximately 86% zero values. Applying a logarithmic transformation still fails to fully address the right-skewed distribution of the data, which may lead to biased estimates. To mitigate this issue, the dependent variable is replaced with the number of cross-regional subsidiaries (number) and re-estimated using a Poisson count model. Furthermore, since the decision of whether to invest in a specific location is a primary consideration in a firm's cross-regional investment process, the dependent variable is also substituted with a dummy variable (virtual) indicating the presence of cross-regional subsidiaries, followed by regression using both logit and probit models.

Considering that significant differences between treatment and control groups, along with sample selection bias, may lead to unstable estimation results, this study utilizes all control variables as matching covariates and applies nearest-neighbor propensity score matching with a matching ratio of 1:3 to balance the sample. Postmatching, the regression is re-estimated. Additionally, since municipalities differ from ordinary provincial-level administrative regions in terms of urban scale, policy advantages, and political status—which may substantially affect firms' cross-regional investment decisions—the sample of municipalities is excluded before regression. Furthermore, given that the regional pandemic control policies and economic shocks triggered by the public health emergency in 2020 could significantly interfere with firms' cross-regional investment activities, observations from the year 2020 are also removed prior to estimation. Furthermore, considering that enterprises may establish “shell companies” to benefit from policy advantages such as tax rate differences and industrial subsidies across provinces, this paper first matches the cross-province subsidiaries of enterprises with industrial and commercial registration information, then aggregates them to obtain the total registered capital of enterprises' cross-province subsidiaries in each province. We add one to this value and take the logarithm as a new dependent variable (new_invest) for regression estimation. In reality, enterprises may overstate their registered capital to obtain financing convenience or meet market access restrictions, leading to inflated registered capital. To address this, we match the industrial and commercial registration codes of enterprises' cross-province subsidiaries with tax survey data from 2011 to 2020 to obtain the actual paid-in registered capital of these subsidiaries. On this basis, we aggregate the actual investment amounts of enterprises in each province, take the natural logarithm, and use it as the dependent variable (real_invest) for regression estimation.

TABLE 3. Controlling for other policy interventions

Variable	(1) invest	(2) invest	(3) invest	(4) invest	(5) invest
bdmo	0.008*** (0.002)	0.007*** (0.002)	0.010*** (0.002)	0.007*** (0.002)	0.009*** (0.002)
VAT input tax credit refund	−0.009*** (0.002)				−0.009*** (0.002)
The provincial-level unified management reform of court personnel, finances, and assets		0.006*** (0.002)			0.009*** (0.002)
The provincial new-type urbanization pilot zone policy			0.053*** (0.005)		0.054*** (0.005)
Government data openness				0.014*** (0.002)	0.014*** (0.002)
constant	−3.641*** (0.122)	−3.759*** (0.127)	−3.685*** (0.122)	−3.244*** (0.132)	−3.476*** (0.137)
Parent firm(FE)	YES	YES	YES	YES	YES
Province(FE)	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES
R ²	0.247	0.247	0.248	0.247	0.248

Columns (1)-(5) in Table 4 and columns (1)-(5) in Table 5 report the results of these robustness tests. The findings indicate that big data management institutional reform has a positive and significant effect on enterprises' cross-region investment at least at the 10% level, which is basically consistent with the conclusions from the baseline regression. This further demonstrates that digital government construction can indeed promote enterprises' cross-region investment activities.

4) Instrumental Variable (IV) Approach

Since digital government development is potentially influenced by regional economic conditions and industrial structures, while enterprises' inter-regional investment simultaneously affects these same regional factors, a reverse causality problem exists between digital government construction and inter-regional investment. This study employs the instrumental variable (IV) approach to address this endogeneity concern. Instrumental variables must satisfy the criteria of relevance and exogeneity. Accordingly, this study employs the interaction term between topographic relief and time trend as the instrumental variable (IV). The effectiveness of digital government construction relies on digital information technologies. In regions with greater topographic relief, the construction costs of digital infrastructure such as signal base stations are higher, the implementation cycles are longer, and the quality of digital signals is more susceptible to terrain-related interference. Based on this, a reasonable expectation can be drawn that higher topographic relief impedes the effectiveness of digital government development, thereby satisfying the relevance requirement for an instrumental variable. Furthermore, topographic relief is naturally formed and is not subject to interference from economic or other factors, which fulfills the exogeneity requirement. Column (1) of Table 5 reports the first-stage regression results of the instrumental variable on the endogenous variable. The coefficient is significantly negative at the 1% level, confirming that topographic relief indeed exerts a negative influence on digital government development. Furthermore, the F statistic surpasses the critical threshold

for weak instrument tests, indicating no evidence of weak instruments. Column (2) presents the second-stage estimation results of the core explanatory variable after instrumental variable adjustment. The positive coefficient is statistically significant at the 1% level, showing robust consistency with the main regression findings. Column (6) of Table 5 presents the first-stage results of the instrumental variable on the endogenous variable, which is significantly negative at the 1% level, demonstrating that terrain ruggedness indeed has a negative impact on digital government construction. Moreover, the value of the weak instrument test (C-D Wald F statistic) is far greater than the critical value, rejecting the weak instrument hypothesis. This further confirms that the instrumental variable satisfies the relevance condition and is valid. Column (7) presents the second-stage results of the core explanatory variable after instrumental variable estimation, which is significantly positive at the 1% level, remaining largely consistent with the baseline regression results.

C. MECHANISM TESTS

Digital government development fosters information interconnectivity across regions, departments, and between government and society, enabling the integration, sharing, and utilization of data resources. This not only reduces external transaction costs in cross-regional investments by standardizing government conduct and alleviating inter-regional information asymmetry, but also enhances mutual trust between credit suppliers and demanders, thereby lowering debt financing costs and providing more substantial financing support for trans-regional investments. Grounded in this logic, we conduct mechanism testing by constructing interaction terms.

External transaction costs constitute a significant factor influencing corporate cross-regional investment. On one hand, elevated external transaction costs encroach upon anticipated returns from cross-regional investments, thereby diminishing firms' willingness to invest in such regions. On the other hand, markets characterized by high external transaction costs tend to foster relational transactions among

TABLE 4. Other Robustness Tests

Note Variable	Industry-Year Fixed Effects (1) invest	Parent Company-Subsidiary Province Fixed Effects (2) invest	Poisson Count Model (3) invest	logit (4) invest	probit (5) invest
bdmo	0.008*** (0.002)	0.008** (0.001)	0.039*** (0.023)	0.038** (0.018)	0.023** (0.010)
constant	−3.479*** (0.121)	−3.587*** (0.089)	−11.637*** (1.932)	−19.992*** (1.307)	−11.528*** (0.676)
Control Variables	YES	YES	YES	YES	YES
parent firm FE	YES	YES	YES	NO	NO
province FE	YES	YES	YES	YES	YES
time FE	YES	YES	YES	YES	YES
parent firm industry × time FE	YES	NO	NO	NO	NO
parent-subsidiary province FE	NO	YES	NO	NO	NO
observations	535246	535246	535246	535246	535246
R ²	0.253	0.714	0.358	0.114	0.114

TABLE 5. Other Robustness Tests and II and Endogeneity Test

Variable	(1) invest	(2) invest	(3) invest	(4) new_invest	(5) new_invest	(6) bdmo	(7) invest
bdmo	0.005*** (0.003)	0.008*** (0.002)	0.007*** (0.002)	0.049*** (0.013)	0.280*** (0.026)		0.135*** (0.009)
constant	−3.806*** (0.257)	−3.504*** (0.127)	−3.667*** (0.129)	−6.340*** (0.816)	−7.139*** (2.230)	C-D Wald F:24743.08	
IV						−0.012*** (0.001)	
Control variable	YES	YES	YES	YES	YES	YES	YES
Parent firm(FE)	YES	YES	YES	YES	YES	YES	YES
Province(FE)	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES
observations	306472	467370	49543	535246	66543	15946	535246
R ²	0.267	0.251	0.244	0.133	0.479	-	0.050

market participants, which impedes the integration of non-local enterprises into local markets and creates implicit barriers to cross-regional investment. Reform of big data management institutions, however, contributes to the reduction of external transaction costs and facilitates cross-regional corporate investment. First, digital government construction help standardize government behavior while improving governmental efficiency and regulatory quality, thereby fostering a favorable external environment for market transactions. Second, such reforms strengthen mechanisms for data openness and sharing, which helps mitigate informal institutional conflicts and trust crises between transacting parties arising from information asymmetry, consequently reducing external transaction costs. This study utilizes the mean value of macro-level transaction costs measured to assess the level of external transaction costs (*hight_trade*). If the mean macro transaction cost of a cross-regional investment destination exceeds the median, the region is considered to have high external transaction costs, and the variable *hight_trade* is assigned a value of 1; otherwise, it is assigned 0. Subsequently, an interaction term *hight_trade* × *bdmo* is constructed and incorporated into the baseline regression model for mechanism testing. Column (1) of Table 6 reports the results The coefficient of the interaction term is positively significant at the 1% level, indicating that the effect of big data management institutional reform is more pronounced in regions with higher external transaction

costs. From the perspective of marginal effects, this suggests that reform of big data management institutions can promote investment by non-local enterprises in such regions through lowering external transaction costs.

Debt financing costs also constitute an important factor influencing firms' cross-regional investment behavior. In practice, funds required for corporate investment are primarily derived from two channels: internal financing and external financing. However, as the scale of internal financing is often limited and generally prioritized for meeting mandatory expenditures on existing production and operational activities, the significance of external financing in corporate investment activities has become increasingly prominent [18]. As a primary form of external financing, elevated debt financing costs not only compress the expected returns of cross-regional investment but also amplify operational risks associated with such investments, thereby dampening firms' willingness to invest across regions. A key driver of higher debt financing costs is financial friction. Since firms investing across regions originate from outside the local market, information asymmetry between lenders and borrowers tends to be more pronounced. To mitigate moral hazard and adverse selection, credit providers often require borrowers to furnish collateral and raise interest rates to secure higher risk compensation, consequently driving up the cost of debt financing. The reform of big data management institutions further facilitates the cross-regional and

TABLE 6. Mechanism tests

Variable	(1) invest	(2) invest
bdmo	−0.008*** (0.002)	0.002*** (0.002)
hight_trade*bdmo	0.033*** (0.002)	
hight_debt*bdmo		0.015*** (0.002)
Control Variables	YES	YES
Constant	−3.273*** (0.122)	−3.645*** (0.122)
Province(FE)	YES	YES
parent firm FE	YES	YES
Time FE	YES	YES
observations	535246	530545
R^2	0.247	0.248

cross-departmental flow of information elements. This helps break down information barriers between credit suppliers and demanders, conveys the genuine creditworthiness of enterprises, and enhances mutual trust between both parties, thereby reducing the cost of debt financing. This study uses the ratio of the sum of corporate interest expenses, handling charges, and other financial costs to total liabilities at the end of the period to measure the level of debt financing costs (hight_debt). Specifically, the mean debt financing cost for each firm prior to the reform of big data management institutions was first calculated. Then, the median of these means was computed. If a firm's mean debt financing cost exceeds this median, it is classified as having high debt financing costs, and the variable hight_debt is assigned a value of 1; otherwise, it is assigned 0. Subsequently, an interaction term $\text{hight_debt} \times \text{bdmo}$ is constructed and incorporated into the baseline regression for mechanism testing. Column (2) of Table 6 reports the test results for the mechanism of reducing debt financing costs. The reform's impact on cross-regional investment is amplified for high financing-cost firms, as evidenced by the positive and significant interaction coefficient (1% level). From the perspective of marginal effects, the reform can encourage firms to invest in the region through lowering debt financing costs.

D. HETEROGENEITY ANALYSIS

1) Corporate Governance Heterogeneity

Internal corporate governance architecture constitutes a factor influencing firms' cross-regional investment decisions. In firms characterized by CEO duality, the convergence of ownership and management enables them to more readily identify and capitalize on the institutional dividends generated by big data management institutional reforms for cross-regional investment. Moreover, CEO duality streamlines decision-making processes and enhances efficiency, allowing firms to expeditiously execute cross-regional investment upon opportunity recognition. Conversely, in firms without CEO duality, managers acting on self-interest motivations may favor projects with personal affiliations, thereby attenuating the attractive effect of big data management institutional

reforms on cross-regional investment. The foregoing analysis suggests that the efficacy of big data management institutional reforms in stimulating cross-regional investment is amplified among firms characterized by CEO duality. A firm is identified as having CEO duality when a single individual concurrently assumes both the CEO and board chair roles, and vice versa. Accordingly, a heterogeneity test was conducted using subgroup regression. Columns (1) and (2) of Table 7 present the results for the subgroups of firms with and without CEO duality, respectively. The coefficient of the core explanatory variable is positively significant at the 5% level in both subgroups, indicating that the reform promotes cross-regional investment regardless of CEO duality. However, the absolute value of the coefficient is larger for the subgroup with CEO duality than for the subgroup without it, suggesting that the reform has a stronger promoting effect on cross-regional investment for firms with CEO duality. This finding supports the inference above.

2) Industry Competition Heterogeneity

Classical market competition theory holds that, under the assumption of rational economic agents, firms seek to maximize their self-interest within resource constraints. As a form of spatial capital allocation, cross-regional investment not only enables enterprises to reduce their tax burden by exploiting inter-regional tax rate differentials, but also helps enhance their long-term competitive advantages by improving innovation capabilities. When a firm operates in a highly competitive industry, it may be more proactive in pursuing cross-regional investment to enhance internal resource allocation efficiency and achieve cost reduction and performance improvement. On the other hand, non-cooperative competition among firms regarding cross-regional expansion can also compel enterprises to engage in such investments. Meanwhile, the reform of big data management institutions helps alleviate interregional information barriers and optimize the institutional environment of investment destinations, thereby reducing the risks associated with cross-regional investment and further incentivizing firms to invest in these regions. Based on the above analysis, it can be inferred that when firms operate in industries with higher competitive intensity, the reform of big data management institutions tends to be more effective in promoting investment into the region. The median of the industry-level Herfindahl – Hirschman Index (HHI) is employed. Firms in industries with an HHI below the median are classified as belonging to low-competition-intensity sectors, and vice versa. Subgroup regression is then conducted for validation. Columns (3) and (4) of Table 7 report the results for the subgroups with low and high industry competition intensity, respectively. The coefficients of the core explanatory variable are positively significant at the 5 % level in both subgroups, indicating that the reform attracts cross-regional investment irrespective of the level of industry competition. However, in terms of absolute coefficient magnitude, the coefficient is larger

in the high-competition-intensity subgroup, suggesting that the reform exerts a stronger promoting effect on regional investment when industry competition is more intense.

3) Tax Reliance Heterogeneity

Tax revenue constitutes a vital source of local fiscal income. When local governments exhibit a high degree of reliance on tax revenues, they may pursue higher tax revenue targets and strengthen tax enforcement efforts to gain advantages in the “promotion tournament”, thereby increasing the actual tax burden on enterprises. In practice, firms’ cross-regional investment decisions focus significantly on the expected returns from such investments. A heavier tax burden resulting from local governments’ high tax reliance further squeezes the actual profits that may be obtained from cross-regional investment. Although the reform of big-data management institutions can optimize the institutional environment and reduce financing costs, the increased tax burden may partially offset the institutional dividends generated by the reform, thereby weakening firms’ willingness to invest in these

regions. Based on the above analysis, it is anticipated that when local fiscal reliance on taxation is relatively high, the attractiveness of big data management institutional reform for cross-regional corporate investment will correspondingly diminish. To measure the degree of tax reliance, we employ the ratio of local fiscal tax revenue to total local fiscal revenue. If the tax reliance of a cross-regional investment destination exceeds the median, the region is classified as having a high degree of fiscal tax reliance, and vice versa. Subsequently, a subgroup regression approach is adopted for empirical testing. Columns (5) and (6) of Table 7 report the test results for the high tax-dependency and low tax-dependency subgroups, respectively. Notably, the estimated coefficient for the key explanatory variable fails to attain statistical significance within the high fiscal tax-dependence subsample. In the low tax-dependency subgroup, the coefficient is positively significant at the 5 % level, indicating that the reform of big data management institutions more effectively promotes corporate investment in regions with lower tax dependency.

TABLE 7. Heterogeneity Analysis

Variable	CEO Duality (1) invest	Non-CEO Duality (2) invest	Low Competition Intensity (3) invest	High Competition Intensity (4) invest	High Tax Dependency (5) invest	Low Tax Dependency (6) invest
bdmo	0.008*** (0.002)	0.007*** (0.002)	0.010** (0.002)	0.007*** (0.002)	0.009*** (0.002)	
VAT input tax credit refund	−0.009*** (0.002)				−0.009*** (0.002)	
The provincial-level unified management reform of court personnel, finances, and assets			0.006*** (0.002)		0.009*** (0.002)	
The provincial new-type urbanization pilot zone policy			0.053*** (0.005)		0.054*** (0.005)	
Government data openness				0.014*** (0.002)	0.014*** (0.002)	
constant	−3.641*** (0.122)	−3.759*** (0.127)	−3.685*** (0.122)	−3.244*** (0.132)	−3.476*** (0.137)	
parent firm FE		YES	YES	YES	NO	NO
province FE		YES	YES	YES	YES	YES
time FE		YES	YES	YES	YES	YES
R ²		0.247	0.247	0.248	0.247	0.248

VI. CONCLUSION

This study relies on panel data spanning A-share listed enterprises in China, enabling an examination of how digital government construction shapes cross-regional investment patterns at the micro level. The results indicate that digital government development, proxied by the institutional reform of big data administrations, significantly positively impacts cross-region investment principally through two mediating mechanisms: reducing both transaction costs and the corporate debt financing costs. Further analysis reveals that the facilitative effects of digital government construction and cross-region investment present heterogeneity across geographies, industries and firms.

Based on empirical findings, this paper offers three practical implications to promote cross-region investment. First, governments ought to establish a more mature and comprehensive digital-government system framework. It is imperative to further strengthen digital infrastructure development by accelerating the deployment of data centers, 5G networks, and other regional digital facilities to enhance

inter-regional digital connectivity, thereby providing robust hardware support for cross-region investment. Enhancing digital government services through expanded application scenarios and intelligent process optimization to improve cross-region investment facilitation. Market-oriented operations can be explored through government procurement of services and data asset management, to promote cooperation among governments, enterprises, and social organizations. By fully leveraging the strengths of all parties, a multi-stakeholder participation model for digital government construction can be established. In addition, sustained efforts to deepen the digital government construction are warranted. by addressing multiple aspects such as top-level design, functional optimization, collaborative cooperation, and technological application, in order to fully realize the policy effectiveness of digital governance.

Second, Enterprises should make full use of the favorable policies and actively participate in development of national unified market. This can not only help enterprises simplify the approval procedures for cross-region investment, save

time and labor costs, and improve investment efficiency, but also enable them to actively participate in regional industrial, expand market channels, optimize the layout of the industrial chain, and enhance market competitiveness. By using digital methods to optimize supply chain management and customer relationship management, they can better adapt to the competitive demands of the national unified market. The construction of digital government emphasizes the role of industry associations and chambers of commerce and strengthens self-regulation in industries. Enterprises can enhance cooperation and communication within their industries to help establish and implement industry standards, thereby improving overall competitiveness.

Third, Currently, there are great differences in the types of enterprises and their governance models in China. To better align digital government policies with the needs of cross-region investment and provide clearer guidance, the following measures can be taken: adopt policies according to local conditions. For low tax-dependence regions, digital environment optimization and accelerated digital government construction should be prioritized. High tax-dependence regions, meanwhile, should receive tax incentives and financial subsidies. And tailor policies to different enterprises. For example, offer digital transformation subsidies and training for highly competitive industries; provide financial support and faster approvals to companies where the CEO also serves as chairman, reducing their cross-region investment costs. These steps will encourage more businesses to invest in other regions.

AUTHOR CONTRIBUTIONS

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All authors have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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