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Information Disclosure and Smart Financing: A Quasi-Natural Experiment from China's New Securities Law

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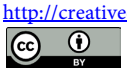

Abstract

Against the backdrop of smart city construction and digital transformation of urban business, information disclosure has become a core link balancing corporate privacy protection with urban financial development, while smart financing drives high-quality urban business growth. In this study, we define smart financing operationally as the process by which firms utilize information embedded in stock prices to guide and optimize investment decisions, captured empirically by investment-stock price sensitivity. The 2020 new Securities Law marks a historic reform in China's disclosure regulation, offering a rare quasi-natural experiment to examine how disclosure data empowers smart financing efficiency. Using Chinese A-share listed firms from 2017 to 2024 and continuous disclosure ratings, this paper employs a difference-in-differences model to investigate the impact, mechanism, and heterogeneity of strengthened disclosure on investment-stock price sensitivity. We find that post-reform, investment-stock price sensitivity—a key smart financing metric—rose significantly among firms with poor prior disclosure. A one-level deterioration in disclosure rating is associated with a 0.0089 unit increase in sensitivity; relative to the sample mean sensitivity of 0.0327, this corresponds to a 27.2% increase, confirming the decision-empowering value of disclosure data. Mechanism tests reveal increased institutional ownership and analyst coverage for treated firms, with institutional shareholding partially mediating the effect, uncovering a "disclosure → information acquisition → price feedback" pathway. Heterogeneity analysis shows stronger effects in high-tech industries and low-financing-constraint firms, highlighting data value and transformability as key boundary

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conditions. Robustness tests (alternative measures, placebo tests, etc.) support these findings. This study is the first to assess enhanced disclosure's impact on market feedback within China's capital market using a quasi-natural experiment. It reveals asymmetry between disclosure quality and market efficiency in smart financing contexts and clarifies the role of institutional investors and analysts as information processors. Findings offer empirical evidence for regulators evaluating the new law's effects and optimizing disclosure systems, while guiding firms on disclosure's strategic value and investors on enhancing information processing capabilities.

Keywords

Information Disclosure, Smart Financing, New Securities Law, Market Feedback Effect, Investment-Stock Price Sensitivity, Urban Business, Quasi-Natural Experiment, Data-Driven Decision-Making, Difference-in-Differences (DiD)

1. Introduction

1.1. Research Background

In the era of smart city construction and the digital transformation of urban business ecosystems, data has become a core production factor, and information disclosure serves as the fundamental institutional arrangement through which urban listed corporations release governance data to the capital market. High-quality information disclosure can effectively reduce information asymmetry between investors and urban enterprises, enhance market pricing efficiency, protect investors' legitimate rights and interests, and guide capital to flow toward efficient urban businesses, thereby achieving optimal resource allocation across metropolitan economic clusters. For this reason, regulatory authorities in various countries have always prioritized the improvement of the information disclosure system in capital market reforms, striving to build a more transparent and efficient data ecosystem that supports the financing needs of urban enterprises.

On March 1, 2020, China's new Securities Law officially came into effect, representing a landmark quasi-natural experiment for examining the interplay between information regulation and urban business finance. One of the most notable changes is the addition of a dedicated chapter on "Information Disclosure", which establishes the principle of "concise, clear, and easy to understand" communication. For the first time, it explicitly requires issuers to "disclose information to all investors simultaneously" and significantly increases the penalties for violations of information disclosure. This reform marks the entry of China's capital market information disclosure regulation into a new regime of heightened disclosure standards, and also signifies a systematic improvement in the quality, readability, and fairness of data resources released by urban enterprises to the market. From the perspective of data science applied to urban business analytics, infor-

mation disclosure rating data, as an important label for measuring the quality of enterprise information transparency, is valuable not only in meeting compliance requirements but also in providing decision support for urban market participants and empowering the smart financing operations of the capital market within the urban economic sphere.

In this study, we define "smart financing" operationally as the process by which firms utilize information embedded in capital market prices (specifically, stock prices) to guide and optimize their investment decisions, thereby improving capital allocation efficiency. This process is empirically captured by investment-stock price sensitivity—a standard measure of the market feedback effect.

However, the theoretical community has not reached a consensus on the economic consequences of mandatory information disclosure for urban business financing efficiency. Traditional views hold that increasing information disclosure can enhance the total amount of public information in the market, thereby improving market efficiency—a clear benefit for urban firms seeking to attract capital. However, recent theoretical research has shown that mandatory disclosure may also produce a "crowding-out effect": when public information is overly abundant, investors' incentives to obtain private information about specific urban enterprises decrease, as the profit potential of private information is compressed (Goldstein & Yang, 2018). If investors no longer actively explore and analyze private information about urban companies, the new information contained in stock prices will diminish, thereby weakening the function of prices in guiding resource allocation within the urban business landscape. In other words, more information disclosure is not necessarily better for smart financing; moderate information retention may actually incentivize market participants to produce information and enhance the market's "feedback effect"—that is, the ability of managers of urban firms to learn new information from stock prices and optimize investment and financing decisions accordingly (Bond et al., 2012; Luo, 2005).

Pinto (2023) empirically examined for the first time the impact of relaxation of disclosure requirements on the learning effect of enterprises, utilizing the natural experiment provided by the U.S. JOBS Act. He found that emerging growth companies that enjoyed reduced disclosure treatment attracted more informed investors, and their investment sensitivity to stock prices—a core indicator of smart financing efficiency—was significantly higher than that of similar companies with stricter disclosure requirements. This learning effect was particularly prominent in companies with industry expert investors. This discovery reveals a possible non-monotonic relationship between information disclosure and market feedback within the urban capital market: a moderate reduction in disclosure can incentivize investors to produce information, thereby enhancing the ability of urban enterprises to learn from the market. However, when information disclosure requirements are strengthened through a quasi-natural experiment like China's new Securities Law, will the market feedback effect exhibit a symmetrical weakening? This question has not been fully tested, especially in China's emerging and transi-

tional urban capital market. Whether strengthening information disclosure helps or hinders urban enterprises' ability to engage in smart financing by learning from the market remains an empirical question that needs to be answered.

The implementation of China's new Securities Law provides a rare institutional context for answering the aforementioned questions. In contrast to the JOBS Act, which reduces disclosure, the new Securities Law significantly strengthens information disclosure requirements, particularly posing a greater compliance challenge to urban enterprises with poor information disclosure quality. Based on this, this paper takes the implementation of the new Securities Law as a policy shock—a quasi-natural experiment—measures urban enterprise information disclosure quality using continuous information disclosure ratings, and employs a difference-in-differences model to examine the impact of strengthened information disclosure on urban enterprise investment-stock price sensitivity (i.e., market feedback effect, a core metric of smart financing efficiency), further exploring its mechanism of action and heterogeneous manifestations across different segments of the urban business ecosystem. This study not only provides new evidence from an emerging market for the theoretical debate on the economic consequences of information disclosure, but also offers a reference for regulators to assess the implementation effects of the new Securities Law and optimize the design of the information disclosure system to foster smart financing in urban business.

1.2. Problem Statement

The aforementioned background leads to a core issue worthy of in-depth exploration in the context of urban business finance: how will the market feedback effect—and by extension, smart financing efficiency—change when information disclosure requirements are strengthened rather than relaxed? Specifically, does the implementation of the new Securities Law enhance the investment-stock price sensitivity of urban enterprises? Or, do stricter information disclosure requirements crowd out the information production of informed investors, thereby weakening the ability of urban managers to learn from the market and execute data-driven smart financing decisions?

Based on research conducted under the JOBS Act, Pinto found that reducing disclosure can attract more informed investors, thereby enhancing the ability of companies to learn from stock prices. It is unclear whether this conclusion is symmetrical in the case of a quasi-natural experiment that increases disclosure mandates. Theoretically, there are two opposing possibilities for the impact of enhanced information disclosure on the market feedback effect within the urban capital market. On the one hand, enhanced information disclosure can directly increase the supply of public data and reduce investors' information processing costs regarding urban listed firms, potentially attracting more investor attention and thereby enhancing the information content and feedback effect of stock prices—thus improving smart financing outcomes. On the other hand, excessive disclosure may reduce investors' incentives to obtain private information about specific

urban enterprises, leading to a decrease in unknown management information contained in stock prices, and thus weakening the market feedback effect and impairing smart financing efficiency.

From the perspective of data science applied to urban business systems, the essence of this issue lies in: when the quality and quantity of data resources released by urban enterprises—namely, information disclosure—undergo changes due to a regulatory quasi-natural experiment, how do market participants utilize this data for reprocessing and value mining? And how does this processed information feed back to the urban enterprises through stock prices, forming a closed-loop of data-driven decision optimization that characterizes smart financing? The implementation of China's new Securities Law provides a unique institutional setting for examining this data value creation process within urban financial centers. This exogenous policy shock, combined with China's listed companies' information disclosure rating system, enables us to construct a continuous processing intensity index, allowing for a more precise identification of the causal impact of enhanced information disclosure on market feedback effects among urban businesses. Furthermore, the special structure of China's urban capital market, which is dominated by retail investors with a gradually increasing proportion of institutional investors concentrated in major cities, also provides rich research material for examining how different types of data users mine information value in the urban business context.

Based on this, this paper attempts to answer the following three research questions, which are progressively deeper and directly relevant to smart financing in urban business:

Firstly, have the New Securities Law's enhanced information disclosure requirements, as a quasi-natural experiment, significantly affected the investment-stock price sensitivity of urban enterprises? If there is an impact, does it enhance or weaken the ability of urban managers to learn from the market and execute smart financing strategies? This question essentially tests whether information disclosure data, as a core data resource for urban corporate governance, has the value of empowering smart financing decisions.

Secondly, through what mechanism are the aforementioned impacts realized? Specifically, does policy shock transmit to urban corporate investment decisions by altering informed investor behaviors such as institutional investor shareholding ratios and analyst attention within the urban financial ecosystem? This mechanism test aims to reveal how information disclosure data is explored and reprocessed by market participants in urban centers, ultimately realizing the release and return of data value that fuels smart financing.

Thirdly, do policy effects exhibit significant differences across urban enterprises with varying characteristics? Given the higher reliance of high-tech industries—often clustered in urban innovation hubs—on information feedback, and the constraints posed by financing constraints on urban corporate investment flexibility, this paper further examines whether policy effects are more pronounced in high-

tech industries and enterprises with low financing constraints. This heterogeneity analysis helps to reveal the boundary conditions of the value of information disclosure data for smart financing, providing a reference for the precise deployment of data products and differentiated regulation within the urban business landscape.

2. Policy Background, Theoretical Analysis, and Hypotheses

2.1. The Core Changes in the Information Disclosure Reform of China's New Securities Law and Its Implications for Urban Business

On March 1, 2020, the new Securities Law was officially implemented, constituting a plausible quasi-natural experiment for studying the real effects of disclosure regulation on urban listed firms. This marks the second major revision of China's capital market after 15 years, with the reform of the information disclosure system being regarded as the top priority of this revision. Compared to the Securities Law of 1998 and subsequent revisions, the new Securities Law has achieved a shift from "formal regulation" to "substantive fairness" in terms of information disclosure. The core changes can be summarized into the following five aspects, each with distinct implications for the urban business data environment (Feng, 2025).

Firstly, a new chapter dedicated to "Information Disclosure" has been added, establishing a brand-new principle for disclosure. The new Securities Law consolidates the provisions on information disclosure, which were previously scattered throughout various chapters, into Chapter 5, "Information Disclosure", marking the first time that information disclosure is systematically regulated in a dedicated chapter. The chapter clearly states at the outset: "The information disclosed by the information disclosure obligors shall be true, accurate, complete, concise, clear, and easy to understand, and shall not contain any false records, misleading statements, or material omissions". Compared to the original Securities Law, which only required "truthfulness, accuracy, and completeness", the new law adds the principles of "conciseness, clarity, and comprehensibility". This change signifies that information disclosure is no longer merely a compliance issue for urban enterprises; it now demands that information be readable and understandable, aiming to reduce investors' information processing costs and expand the effective coverage of information within the urban financial community.

Secondly, it clarifies for the first time the fairness requirement of "disclosing to all investors simultaneously". Article 78 of the new Securities Law clearly stipulates: "Information disclosure obligors shall disclose information to all investors simultaneously and shall not disclose it to any unit or individual in advance". This provision establishes the principle of fairness in information disclosure at the legal level for the first time, effectively restricting selective disclosure practices that previously allowed some urban firms to share sensitive information preferentially with select investors. Prior to this, some companies may have disclosed sensitive information to specific investors preferentially through "one-on-one communi-

cation", "analyst meetings", and other means common in urban financial circles, resulting in information asymmetry and insider trading. After the implementation of the new law, all information must be disclosed to all investors simultaneously through legal channels, which greatly compresses the space for insider information and forces investors in the urban capital market to rely more on public information for their smart financing decisions.

Thirdly, the punishment for information disclosure violations has been significantly increased. The new Securities Law has significantly strengthened the legal liability for information disclosure violations. For information disclosure obligors who fail to submit relevant reports or fulfill their information disclosure obligations as required, the upper limit of fines has been raised from the original 600,000 yuan to 5 million yuan; for information disclosure obligors who submit reports or disclose information containing false records, misleading statements, or major omissions, the upper limit of fines has been raised from the original 600,000 yuan to 10 million yuan; the upper limit of fines for directly responsible executives and other directly responsible personnel has also been correspondingly raised to 5 million yuan. In addition, the new law introduces a representative litigation system for civil compensation, providing investors with a more convenient judicial path to safeguard their rights. The substantial increase in statutory penalties has significantly increased the expected cost of information disclosure violations for urban listed companies, forming a strong deterrent and improving the credibility of data circulating in the urban business ecosystem.

Fourthly, establish a synchronous disclosure mechanism for both domestic and overseas markets. As more and more Chinese urban enterprises are listed overseas, the time lag issue in information disclosure between domestic and overseas markets has become increasingly prominent. Paragraph 3 of Article 78 of the new Securities Law stipulates that "where securities are publicly issued and traded both domestically and overseas, the information disclosed overseas by the information disclosure obligor shall be simultaneously disclosed domestically". This provision eliminates the space for cross-border information arbitrage, ensures that domestic urban investors can obtain information simultaneously with overseas investors, and safeguards the right to know and the right to fair trading of domestic urban market participants.

Fifth, expand information disclosure channels and clarify requirements for disclosure carriers. Article 86 of the new Securities Law stipulates: "Information disclosed in accordance with the law shall be published on the website of the securities trading venue and on media that meet the conditions prescribed by the securities regulatory authority under the State Council". Compared to the original law, which only required "publication on designated newspapers or special publications", the new law explicitly designates internet channels as legal disclosure carriers, conforming to the trend of information dissemination in the digital era, further reducing the cost of information acquisition for urban investors, and expanding the breadth and depth of information coverage across the urban business net-

work.

The new Securities Law systematically strengthens the information disclosure system from five dimensions: disclosure principles, fairness, punishment severity, cross-border synchronization, and disclosure channels. This reform, which serves as the quasi-natural experiment in this study, not only increases the "quantity" of information disclosure but also enhances the "quality" of information disclosure. Its core objectives are to enhance market transparency, protect investors' rights and interests, and optimize resource allocation within the urban capital market. For urban listed companies, this reform means an increase in compliance costs and an improvement in the data environment, especially for urban enterprises with poor information disclosure quality, which constitutes a more significant impact on data quality. It is this institutional impact that provides an ideal exogenous variation for this study to identify the causal relationship between the strengthening of information disclosure and market feedback effects—a key determinant of smart financing efficiency in the urban business context.

2.2. Theoretical Basis

To understand how information disclosure affects an urban company's ability to learn from the market and execute smart financing strategies, it is necessary to trace back to the core theories of market efficiency, information production, and price discovery in information economics, and re-examine them from the perspective of data science applied to urban financial systems.

The capital market within an urban economy is essentially a complex data ecosystem. There is a natural data asymmetry between insiders within the urban enterprise and external investors: managers possess private data on the business's operating conditions, investment opportunities, and future prospects, while external investors can only indirectly understand the urban enterprise through publicly disclosed data. This information asymmetry can lead to adverse selection and moral hazard problems, impairing market efficiency and the effectiveness of smart financing (Li, 2020). The price system, however, has the function of aggregating and transmitting dispersed information. In the urban capital market, stock prices not only reflect the current fundamentals of the urban enterprise but also aggregate private information from numerous investors, forming a comprehensive judgment on the future value of the enterprise. Therefore, the information content of stock prices becomes an important dimension for measuring market efficiency and the potential for smart financing feedback.

Grossman and Stiglitz (1980) pioneered the theory of information production, pointing out a fundamental paradox in information-efficient markets: if prices fully reflect all information, investors will have no incentive to acquire and process information, as the cost of information cannot be compensated. Therefore, a certain degree of information inefficiency must exist in the urban capital market to maintain investors' incentives for information production. From the perspective of data science in urban business, this paradox reveals the basic logic of data value

creation: raw disclosed information from urban firms needs to undergo a series of processes, such as collection, cleaning, processing, and analysis by market participants located in urban financial centers, before it can be transformed into valuable decision-making insights that support smart financing. Informed investors obtain excess returns precisely through this data mining process, and their trading behavior incorporates the processed data into prices, gradually bringing prices closer to a state of complete information. In other words, data production is an important driving force for price discovery, and the existence of informed investors is key to the effective operation of the urban market data ecosystem.

Based on the aforementioned logic, changes in information disclosure policies, such as those introduced by the quasi-natural experiment of the new Securities Law, directly affect investors' data production behavior regarding urban enterprises. Public information disclosure may substitute for investors' acquisition of private information data, thereby reducing the total amount of information produced about specific urban firms. Gao and Liang (2013) further constructed a theoretical model to systematically analyze the trade-off relationship between information disclosure and market feedback. They found that increasing information disclosure can directly improve the supply of public information data, but it will reduce investors' incentives to acquire private information data, as the profitability of private information is compressed. When private information data production decreases, the unknown information data contained in stock prices also decreases, thereby weakening the function of prices in guiding resource allocation and smart financing decisions by urban managers. This "crowding-out effect" implies that there may be a non-monotonic relationship between information disclosure and market feedback: moderately retaining uncertainty in information data can, on the contrary, incentivize informed investors to produce information data about urban enterprises, enhancing the revelatory efficiency of stock prices and supporting smart financing. The research by Goldstein and Yang (2018) also confirmed that not all information disclosure is conducive to market efficiency; some disclosures may distort investors' information acquisition behavior and reduce the information content of prices within the urban financial landscape.

Stock prices not only passively reflect urban corporate information but also actively convey new information to managers, a process known as the "market feedback effect" (Bond et al., 2012). Luo (2005) found through research on merger and acquisition announcements that market reactions significantly influence managers' decisions on whether to proceed with the transaction, indicating that managers of urban firms indeed learn from stock prices. Bond et al. (2012) distinguished price efficiency into two dimensions: "predictive price efficiency", which refers to the ability of prices to predict future fundamentals, and "revealing price efficiency", which refers to the ability of prices to reveal new information to managers. These two dimensions do not always change synchronously—prices may accurately predict the future, but the information they contain may already be known to urban managers and thus fail to provide new decision-making references for smart

financing (Li, 2013). This paper focuses on the latter, that is, whether prices can convey unknown information to urban managers and thereby guide investment decisions central to smart financing.

The existence of the feedback effect relies on a crucial condition: the stock price of the urban enterprise must contain information unknown to the management. If all information has been made public and accessible to urban managers, the price will lose its revelatory value. Therefore, incentivizing investors to produce private information about urban businesses and incorporate it into the price is a prerequisite for maintaining the feedback effect. This also explains why information disclosure policies may alter an urban company's ability to learn from the market and engage in smart financing by influencing investors' information production.

Based on the above theories, a complete logical chain can be constructed for the urban business context: information asymmetry is a fundamental characteristic of the urban capital market; investors earn profits by generating private information data about urban enterprises, and their trading behaviors incorporate this information into prices; stock prices thus become aggregates of information data and may convey unknown information data to urban managers, guiding investment decisions that constitute smart financing; information disclosure policies indirectly affect the information data content and feedback effect of stock prices by influencing the incentives for investors to produce information data about urban firms. When information disclosure is strengthened, the supply of public information increases, but it may crowd out the production of private information data, leading to a reduction in unknown information about management in stock prices, thereby weakening the market feedback effect and smart financing efficiency. Conversely, moderately relaxing disclosure may incentivize investors to produce information data, enhancing the feedback effect.

Pinto (2023) empirically tested the "relaxation side" of this logic using the institutional scenario of reduced disclosure under the U.S. JOBS Act, finding that reduced disclosure indeed attracted more informed investors and enhanced corporate learning. However, whether the "strengthening side" of this logic is symmetrical—that is, whether increased disclosure would weaken learning and smart financing among urban enterprises—remains untested. The implementation of China's new Securities Law provides a quasi-natural experiment for testing this symmetry within the urban business ecosystem. Based on the aforementioned theoretical framework, this paper systematically examines the impact of enhanced information disclosure on market feedback effects and smart financing efficiency among urban listed firms and investigates its underlying mechanisms.

2.3. Research Hypotheses

Based on the aforementioned theoretical analysis, there are two opposing possibilities regarding the impact of enhanced information disclosure on the market feedback effect and smart financing in urban business. This paper proposes com-

peting hypotheses for further examination.

From the perspective of data supply within the urban financial system, the new Securities Law strengthens the requirements for information disclosure, significantly increasing the supply of public data about urban enterprises. The disclosure principle of "concise, clear, and easy to understand" reduces the data processing costs for urban investors, potentially attracting more data users to pay attention to urban businesses; the fairness requirement of "disclosing to all investors simultaneously" eliminates selective disclosure, making data that was originally only accessible through private channels public; and the increase in punishment strengthens the credibility of data. These changes are all likely to enhance the data content of stock prices of urban firms, enabling urban managers to obtain more decision-making reference information from stock prices, thereby improving investment-stock price sensitivity—a hallmark of smart financing. Based on this, this paper proposes hypothesis H1:

H1 (Smart Financing Enhancement Hypothesis): After the implementation of the new Securities Law as a quasi-natural experiment, the investment-stock price sensitivity (a core indicator of smart financing efficiency) of urban enterprises with poor information disclosure quality has significantly increased, indicating that information disclosure data has the value of empowering smart financing decisions.

Regardless of whether enhanced information disclosure ultimately strengthens or weakens the market feedback effect, its impact is realized through the mechanism of influencing the behavior of informed investors within the urban financial ecosystem. Institutional investors and analysts are the two most important data miners in the urban capital market. Institutional investors possess professional capabilities and scale advantages in data mining, and their trading behaviors can integrate private data about urban enterprises into stock prices (Bai, Philippon, & Savov, 2016); analysts transmit new information to the market through data collection, processing, and dissemination, reducing the degree of information asymmetry regarding urban businesses (Chen, Goldstein, & Jing, 2007). If enhanced information disclosure attracts more attention from institutional investors and analysts in urban financial centers through the data supply effect, the policy should manifest as an increase in institutional shareholding ratio and the number of analysts' coverage for urban firms; conversely, if enhanced information disclosure reduces the value of private data through the data crowding-out effect, it may lead to a decrease in the attention of institutional investors and analysts. Based on this, this paper proposes hypothesis H2:

H2 (Data Miner Attention Mechanism): The implementation of the new Securities Law has significantly affected the shareholding ratio of institutional investors and the attention of analysts toward urban enterprises with poor prior disclosure. Furthermore, institutional shareholding plays a mediating role between the enhancement of information disclosure and investment-stock price sensitivity, revealing the transmission path from "data release to data miner attention to data

feedback" that underpins smart financing.

In addition, the impact of enhanced information disclosure on the market feedback effect and smart financing may vary across urban enterprises with different characteristics. High-tech industry enterprises, which are often concentrated in urban innovation clusters, typically have higher R&D investment and a larger proportion of intangible assets, and their investment opportunities are difficult to reflect through traditional financial indicators fully. Therefore, they rely more on external data feedback to identify investment opportunities and assess project prospects—a key aspect of smart financing. From the perspective of data science in urban business, high-tech industries have higher data density and greater information value, making the value of data mining more significant. At the same time, the degree of financing constraints also limits the ability of urban enterprises to learn from the market. Enterprises with low financing constraints have more abundant financial resources and greater investment flexibility, and can adjust investment decisions in a timely manner based on stock price information (Baker, Stein, & Wurgler, 2003), indicating stronger data transformation capabilities essential for smart financing. However, even if high-financing-constraint urban enterprises obtain new information data from stock prices, they may be unable to implement them due to funding constraints, thus manifesting as ineffective data value transformation. Based on this, this paper proposes hypothesis H3:

H3 (Urban Business Heterogeneity): The impact of enhanced information disclosure on investment-stock price sensitivity—and thus on smart financing efficiency—is more pronounced in high-tech industries and urban enterprises with low financing constraints, indicating that the value and transformability of data are important boundary conditions that affect the effectiveness of smart financing and data-driven decision-making in the urban business landscape.

3. Research Design

3.1. Sample Selection and Data Sources

This paper uses Chinese A-share listed companies from 2017 to 2024 as the initial research sample. The starting year of the sample is chosen to be 2017 because the new Securities Law was implemented in 2020. Selecting three years before and after the policy implementation allows for a better observation of the dynamic effects of policy shocks, while avoiding potential inconsistencies in early data due to changes in accounting standards. The ending year of the sample is set to 2024 to ensure a sufficient observation period after the policy implementation for testing the lag effects.

All the data required for the study are sourced from the CSMAR database developed by Shenzhen Xishima Data Co., Ltd. After obtaining the raw data, the following screening procedures were executed in this paper: 1) excluding listed companies in the financial industry; 2) excluding companies under special treatment such as ST and *ST; 3) excluding companies with non-standard unqualified opinions or unqualified opinions with explanatory notes; 4) excluding observa-

tions with missing main variables; 5) excluding companies listed for less than one year to avoid abnormal fluctuations in financial data in the year of IPO; 6) to eliminate the impact of extreme values, all continuous variables were winsorized at the 1% and 99% quantiles. After the above screening, a total of 29,522 company-year observations were ultimately obtained.

3.2. Variable Definition

3.2.1. Dependent Variable: Investment Level (*ln_Inv_f*1)

This article refers to the research conducted by Pinto (2023), which adopts the ratio of future capital expenditure to current net fixed assets as a measurement, and then takes the natural logarithm after adding 1 to mitigate the problem of skewed distribution of variables. Here, CAPEX refers to "cash paid for the acquisition and construction of fixed assets, intangible assets, and other long-term assets" in the cash flow statement, and PPE_net refers to net fixed assets in the balance sheet.

3.2.2. Core Explanatory Variable

The core explanatory variables include Tobin Q, information disclosure rating (*EvalResult*), and policy dummy variable (*Post*). TobinQ reflects the market's assessment of corporate value, calculated as the ratio of the sum of equity market value and book value of liabilities to total assets, where the equity market value is the sum of the current market value on the last trading day of the year and the value of non-tradable shares. The information disclosure rating *EvalResult* is derived from the exchange's information disclosure evaluation results, with values ranging from 1 to 4, corresponding to excellent, good, qualified, and unqualified, respectively. A higher value indicates poorer information disclosure quality. To avoid post-treatment bias, this paper uses the rating from the year prior to the policy (2019) as the time-invariant treatment intensity. This ensures that the rating is not affected by the 2020 policy shock. The policy dummy variable *Post* takes the value of 1 in 2020 and beyond; it takes the value of 0. To examine the impact of strengthened information disclosure on investment-stock price sensitivity, this paper constructs the following interaction terms: *EvalResult* × *Post* × *TobinQ*, *EvalResult* × *Post*, *EvalResult* × *TobinQ and Post* × *TobinQ*.

3.2.3. Control Variable

The control variables selected are common factors that affect corporate investment decisions, including company size (Size), measured by the natural logarithm of total assets; financial leverage (Lev), measured by the asset-to-liability ratio; profitability (ROA), measured by the ratio of net profit to total assets; and cash flow (CF), measured by the ratio of net cash flow from operating activities to total assets. All control variables are taken as current-period values.

In addition, in the mechanism test, this paper introduces the institutional shareholding ratio (*InstProp*) and analyst attention (*n_analyst*). The institutional shareholding ratio represents the proportion of shares held by institutional investors to the outstanding A-shares, measured in percentage points (i.e., a value of 268.29

corresponds to 268.29%, or 2.6829 in decimal form); analyst attention refers to the number of analysts tracking the company. In the heterogeneity analysis, this paper sets up a dummy variable for high-tech industries (*hi_tech*) and a dummy variable for financing constraints (*HighFC*). The high-tech industries are defined according to the "Classification of High-Tech Industries (Manufacturing) (2017)" published by the National Bureau of Statistics; financing constraints are measured using the SA index proposed by Hadlock and Pierce (2010). If the SA index is higher than the annual median, it is defined as a high financing constraint enterprise (HighFC = 1); otherwise, it is a low financing constraint enterprise (HighFC = 0) (Table 1).

Table 1. Variable description.

Type	Name	Symbol	Definition
Dependent Variable	logarithmic Investment	*ln_Inv_f*1	ln(Capital expenditure for the next period/ Net fixed assets in the current period + 1)
Core Explanatory Variable	Tobin Q	*TobinQ*	(Equity market value + Book value of liabilities)/Total assets
	Information Disclosure Rating	*EvalResult*	Evaluation results of exchange information disclosure: 1 = Excellent, 2 = Good, 3 = Qualified, 4 = Unqualified
	Policy Dummy Variable	*Post*	Take 1 if it is 2020 or later, otherwise take 0
Control Variable	Company Size	*Size*	The natural logarithm of total assets
	Financial Leverage	*Lev*	Total liabilities/Total assets
	Profitability	*ROA*	Net profit/Total assets
	Cash Flow	*CF*	Net cash flow from operating activities/Total assets

3.3. Model Specification

To examine the impact of the new "Securities Law" on the investment-stock price sensitivity of enterprises through enhanced information disclosure, this paper constructs the following two-way fixed effects model:

$$lnInv_{i,t+1} = \alpha_0 + \beta_1 Q_{i,t} + \beta_2 \left(EvalResult_i \times Post_t \times Q_{i,t} \right) + \beta_3 \left(EvalResult_i \times Post_t \right) + \beta_4 \left(EvalResult_i \times Q_{i,t} \right) + \beta_5 \left(Post_t \times Q_{i,t} \right) + \gamma X_{i,t} + \mu_i + \lambda_t + \epsilon_{i,t}$$

In this context, subscripts i and t represent the firm and year, respectively. The dependent variable, $lnInv_{i,t+1}$, represents the logarithmic investment level of firm i in period $t+1$. $Q_{i,t}$ denotes Tobin's Q ratio. $EvalResult_i$ signifies the information disclosure rating of firm i, while $Post_t$ represents the policy dummy variable. $X_{i,t}$ is a vector of control variables, including firm size, financial leverage, profitability, and cash flow, to control for other factors that influence corporate investment decisions. μ_i represents firm-specific fixed effects, which absorb firm heterogeneity that does not change over time; λ_t denotes year-specific fixed effects, used to control for macroeconomic conditions and policy trends over

time; and $\epsilon_{i,t}$ represents random disturbance terms. To mitigate potential heteroskedasticity and serial correlation issues, all regression standard errors are clustered at the firm level.

4. Descriptive Statistics and Preliminary Analysis

4.1. Sample Distribution

After data screening, a total of 29,522 firm-year observations spanning from 2017 to 2024 were ultimately obtained. The sample encompasses all A-share listed companies, excluding those in the financial industry. Specifically, there are 3854 observations in the treatment group (with information disclosure ratings of C or D), accounting for 13.42%, and 24,867 observations in the control group (with information disclosure ratings of A or B), making up 86.58%. There are 8784 pre-policy observations and 20,738 post-policy observations, representing 29.75% and 70.25% of the total sample, respectively. Additionally, there are 13,011 observations from high-tech industry enterprises, constituting 44.07%, and 16,511 observations from non-high-tech industries, accounting for 55.93%. The sample distribution is relatively balanced and is adequate for subsequent empirical analysis.

4.2. Descriptive Statistics

Table 2. Descriptive statistics.

Variable	Observation Count	Mean	Standard Deviation	P25	P50	P75	Minimum	Maximum
$lnInv_{i,t+1}$	24,231	0.265	0.287	0.094	0.182	0.323	0.007	1.850
TobinQ	29,522	2.221	1.499	1.262	1.764	2.611	0.788	9.470
Size	29,522	22.359	1.315	21.418	22.163	23.107	19.953	26.422
Lev	29,522	0.416	0.201	0.256	0.407	0.559	0.060	0.909
ROA	29,522	0.031	0.066	0.010	0.034	0.064	−0.254	0.203
CF	29,522	0.050	0.066	0.012	0.048	0.088	−0.146	0.243
InstProp	29,519	268.290	416.423	105.544	194.261	287.225	0.001	24856.706
n_analyst	17,911	10.153	11.066	2.000	6.000	14.000	0.000	76.000
EvalResult	28,721	1.947	0.614	2.000	2.000	2.000	1.000	4.000
Treat	28,721	0.134	0.341	0.000	0.000	0.000	0.000	1.000
Post	29,522	0.702	0.457	0.000	1.000	1.000	0.000	1.000
hi_tech	29,522	0.441	0.496	0.000	0.000	1.000	0.000	1.000
HighFC	8792	0.551	0.497	0.000	1.000	1.000	0.000	1.000

Table 2 reports the descriptive statistical results of the main variables. It can be seen that the mean of the dependent variable $lnInv_{i,t+1}$ is 0.265, with a standard deviation of 0.287, a minimum value of 0.007, and a maximum value of 1.850, indicating significant differences in investment levels among different enterprises.

The core explanatory variable *TobinQ* has a mean of 2.221 and a standard deviation of 1.499, indicating a relatively dispersed distribution. The information disclosure rating *EvalResult* has a mean of 1.947 and a median of 2.000, indicating that the overall quality of information disclosure of the sample enterprises is good, with most enterprises rated as good. The mean values of the control variables Size, Lev, ROA, and CF are 22.359, 0.416, 0.031, and 0.050, respectively, which are basically consistent with existing literature. The mechanism variables *InstProp* and *n_analyst* have mean values of 268.290 and 10.153, respectively, with large standard deviations, indicating significant differences in institutional ownership and analyst attention among different enterprises.

4.3. Group Difference Test

To preliminarily observe the differences in main variables among different groups, the group with poor information rating, i.e., *EvalResult* ≥ 3, is defined as the treatment group, while the others are defined as the control group. As can be seen from Table 3, the mean value of $lnInv_{i,t+1}$ for enterprises in the treatment group is significantly lower than that for the control group, and the difference is significant at the 1% level. The *Size*, *ROA*, *CF*, *InstProp*, and *n_analyst* of enterprises in the treatment group are also significantly lower than those in the control group, while *Lev* and *EvalResult* are significantly higher than those in the control group. *TobinQ* shows no significant difference between the two groups. These results indicate that enterprises with poor information disclosure quality are generally smaller in scale, weaker in profitability, have less cash flow, higher leverage, and lower institutional ownership and analyst attention. Therefore, it is necessary to control these company characteristics in subsequent multiple regression analyses.

Table 3. Grouping results by information disclosure rating.

Variable	Control Group	Treatment Group	Difference	t-Value
$lnInv_{i,t+1}$	0.266	0.223	0.043***	7.86
TobinQ	2.184	2.207	−0.023	−0.90
Size	22.440	22.138	0.302***	13.43
Lev	0.408	0.488	−0.079***	−22.99
ROA	0.038	−0.013	0.051***	45.84
CF	0.053	0.030	0.023***	20.42
InstProp	273.862	204.247	69.615***	9.73
n_analyst	10.619	6.158	4.461***	15.16

Note: *, **, and *** represent significant tests at the 10%, 5%, and 1% levels, respectively. The same applies to the table below.

Table 4 reports the mean values and difference test results of each variable grouped according to whether the policy was implemented before or after. It can

be seen that the mean value of $lnInv_{i,t+1}$ for post-policy enterprises is slightly higher than that for pre-policy enterprises, but the difference is not statistically significant.

TobinQ for post-policy enterprises has significantly increased, while *Lev* and *ROA* have significantly decreased, and *InstProp* and *n_analyst* have also significantly decreased, indicating systematic changes in sample characteristics before and after the policy. Therefore, it is necessary to control for year fixed effects in the regression.

Table 4. Grouping results before and after policy implementation.

Variable	Pre-Policy	Post-Policy	Difference	t-Value
$lnInv_{i,t+1}$	0.261	0.266	−0.005	−1.36
TobinQ	2.147	2.252	−0.105***	−5.51
Size	22.341	22.367	−0.026	−1.54
Lev	0.422	0.413	0.009***	3.33
ROA	0.038	0.029	0.009***	10.21
CF	0.050	0.050	0.000	0.29
InstProp	282.982	262.068	20.914***	3.95
n_analyst	11.303	9.605	1.698***	9.62

4.4. Correlation Analysis

Table 5. Correlation matrix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) $lnInv_{i,t+1}$	1.000								
(2) *TobinQ*	0.194***	1.000							
(3) *Size*	−0.055***	−0.396***	1.000						
(4) *Lev*	−0.084***	−0.292***	0.459***	1.000					
(5) *ROA*	0.096***	0.197***	0.062***	−0.324***	1.000				
(6) *CF*	−0.004	0.105***	0.098***	−0.149***	0.465***	1.000			
(7) *InstProp*	0.064***	0.047***	0.151***	−0.008	0.096***	0.056***	1.000		
(8) *n_analyst*	0.091***	0.271***	0.341***	0.028***	0.319***	0.248***	0.058***	1.000	
(9) *EvalResult*	−0.054***	−0.027***	−0.275***	0.090***	−0.321***	−0.184***	−0.112***	−0.314***	1.000

Table 5 reports the Pearson correlation coefficients and their significance among the main variables. It can be seen that $lnInv_{i,t+1}$ is significantly positively correlated with *TobinQ*, significantly negatively correlated with *Size* and *Lev*, significantly positively correlated with *ROA*, not significantly correlated with *CF*, significantly positively correlated with *InstProp* and *n_analyst*, and significantly negatively correlated with *EvalResult*. These correlations are generally consistent with theoretical expectations, providing preliminary clues for subsequent regression analysis. *TobinQ* is significantly negatively correlated with *Size* and *Lev*, significantly positively correlated with *ROA* and *CF*, significantly positively correlated with *InstProp* and *n_analyst*, and significantly negatively correlated with *EvalResult*, indicating that enterprises with smaller scale, lower leverage, stronger profitability, and better information environment have higher market valuation. The absolute values of the correlation coefficients between variables are mostly below 0.5, indicating that there is no severe multicollinearity issue.

5. Empirical Results and Analysis

5.1. Parallel Trends Test

To validate the difference-in-differences design, this paper conducts an event-study analysis using the following model:

$$InInv_{i,t+1} = \alpha_i + \lambda_t + \sum_{k=-3}^{-2} \beta_k \left(Treat_i \times Year_{t_0+k} \right) + \sum_{j=0}^{3} \beta_j \left(Treat_i \times Year_{t_0+j} \right) + \gamma X_{i,t} + \epsilon_{i,t}$$

where $Treat_i$ is a dummy variable for firms with poor information disclosure quality ($EvalResult \geq 3$), and $t_0 = 2020$ (the policy implementation year).

The pre-policy coefficients (2017-2019) are not statistically different from zero, supporting the parallel trends assumption. The post-policy coefficients become positive and significant from 2021 onward, indicating a delayed but persistent policy effect. (Figure available upon request.)

5.2. Main Regression Results

To examine the impact of the new "Securities Law" on the investment-price sensitivity of enterprises through enhanced information disclosure, this paper estimates a two-way fixed effects model, and the results are reported in Table 6. All regressions control for firm fixed effects and year fixed effects, with standard errors adjusted for clustering at the firm level. Column (1) only includes Tobin's Q and core triple interaction terms; column (2) adds control variables; column (3) further controls for industry fixed effects; and column (4) is the most saturated model, including both industry and year fixed effects. Considering that the information disclosure rating is a continuous variable and the policy shock is exogenous, the setting of continuous triple interaction terms can more precisely capture the treatment effect brought about by differences in information disclosure quality.

As can be seen from Table 6, the coefficient of the core explanatory variable,

the triple interaction term *EvalResult* × *Post* × *TobinQ*, is positive in all columns and is significant at least at the 5% level. Taking the complete model in column (4) as an example, the coefficient is 0.0089, indicating that after the implementation of the new Securities Law, for every one-level increase in information disclosure rating (i.e., a one-level decrease in information disclosure quality), the investment-stock price sensitivity of enterprises increases by an average of 0.0089 units. Considering that the average level of investment-stock price sensitivity during the sample period is approximately 0.0327, this increase is equivalent to a 27.2% increase relative to the sample mean (0.0089 / 0.0327 ≈ 0.272), which is economically significant. This result suggests that strengthening information disclosure enhances enterprises' ability to learn from stock prices by increasing public information supply and attracting investor attention, rather than crowding out private information production.

Table 6. Main regression results.

Variable	(1)	(2)	(3)	(4)
TobinQ	0.0333***	0.0331***	0.0329***	0.0327***
	(5.91)	(5.88)	(5.86)	(5.83)
EvalResult × *Post* × *TobinQ*	0.0090**	0.0090**	0.0089**	0.0089***
	(2.51)	(2.52)	(2.54)	(2.65)
EvalResult × *Post*	−0.0148**	−0.0148**	−0.0147**	−0.0148**
	(−2.30)	(−2.31)	(−2.30)	(−2.32)
EvalResult × *TobinQ*	−0.0087***	−0.0087***	−0.0087***	−0.0087***
	(−3.26)	(−3.27)	(−3.27)	(−3.28)
Post × *TobinQ*	−0.0113*	−0.0113*	−0.0112*	−0.0113*
	(−1.79)	(−1.79)	(−1.78)	(−1.78)
Size		0.0198**	0.0197**	0.0197**
		(2.53)	(2.52)	(2.52)
Lev		−0.1283***	−0.1283***	−0.1283***
		(−4.35)	(−4.35)	(−4.35)
ROA		0.2843***	0.2843***	0.2843***
		(7.63)	(7.63)	(7.63)
CF		−0.0137	−0.0137	−0.0138
		(−0.43)	(−0.43)	(−0.43)
Constant Term	0.1532***	−0.1633	−0.1633	−0.1633
	(8.26)	(−0.95)	(−0.95)	(−0.95)
Company Fixed Effects	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES
Industry Fixed Effects	FALSE	FALSE	YES	YES
Observation Count	23,317	23,317	23,317	23,317
Adjusted R^2	0.5695	0.5697	0.5697	0.5698

The signs of other control variables are consistent with expectations: the coefficient of Tobin's Q is significantly positive, indicating that overvalued companies invest more; the coefficient of company size is significantly positive, suggesting that larger companies have larger investment scales; the coefficient of financial leverage is significantly negative, in line with the expectation of debt-constrained investment; the coefficient of profitability is significantly positive, indicating that profitable companies invest more; the coefficient of cash flow is negative but not significant, possibly related to the complex relationship between investment and cash flow.

From the perspective of data science, this result reveals that information disclosure rating, as a core label data of corporate governance, possesses significant decision-making empowerment value. Under policy shocks, enterprises with poor information disclosure quality exhibit richer incremental data information in their stock prices. Managers can learn from this data and optimize investment decisions, forming a complete closed loop from "data release to data mining to data feedback to data-driven decision-making". This finding supports the information supply hypothesis, which suggests that enhanced information disclosure improves enterprises' ability to learn from stock price data by increasing public data supply and reducing investors' data processing costs, rather than crowding out private data production.

The signs and significance of the control variables align with theoretical expectations. The coefficient of Tobin's Q is significantly positive, indicating that highly valued companies invest more in the future, consistent with classical Q theory. The coefficient of company size is significantly positive, reflecting that larger companies have larger investment scales. The coefficient of financial leverage is significantly negative, indicating that companies with high debt ratios face stronger financing constraints, inhibiting investment. The coefficient of profitability is significantly positive, indicating that profitable companies have more internal funds to support investment. The coefficient of cash flow is negative but not significant, possibly related to companies relying more on external financing for investment.

The above results support the research hypothesis H1, that is, the new Securities Law strengthens information disclosure requirements and significantly enhances the investment-stock price sensitivity of enterprises with poor information disclosure quality. This indicates that after the implementation of the policy, these enterprises can obtain more useful decision-making information from stock price data and optimize investment decisions. This finding forms an interesting contrast with Pinto's research based on the JOBS Act: Pinto found that reducing disclosure can enhance learning, while this paper finds that increasing disclosure can also enhance learning, but the target is enterprises with a poor initial data environment. This suggests that the relationship between information disclosure and market feedback is not simply linear and monotonous, but depends on the initial data environment of the enterprise and the direction of policy action. For enterprises with poor data quality, the increase in public data brought about by strengthened information disclosure may outweigh the crowding-out effect on private data production, thereby en-

hancing the data content and feedback effect of stock prices overall.

5.3. Mechanism Test

The main regression results from the previous section indicate that after the implementation of the new Securities Law, the investment-stock price sensitivity of enterprises with poor information disclosure quality has significantly increased. What is the mechanism behind this effect? According to theoretical analysis, information disclosure may affect the market feedback effect by influencing the behavior of informed investors. Specifically, strengthening information disclosure may attract more attention from institutional investors and analysts. These data miners integrate more incremental information into stock prices through data collection, cleaning, processing, and trading activities, thereby enhancing the data content and revelatory efficiency of stock prices. To test this mechanism, this paper analyzes the following three levels.

5.3.1. The Impact of Policies on the Attention of Data Miners

Institutional investors are the foremost data miners in the capital market, and their changes in shareholdings can reflect the impact of policies on data production incentives. This paper constructs the following model to examine the impact of policies on institutional shareholding ratios:

$$InstProp_{i,t} = \alpha_0 + \beta_1 \left(Treat_i \times Post_t \right) + \beta_2 Treat_i + \gamma X_{i,t} + \mu_i + \lambda_t + \epsilon_{i,t}$$

Among them, $Treat_i$ is a dummy variable for the treatment group, taking the value of 1 if the enterprise's information disclosure rating is poor ($EvalResult \geq 3$), otherwise it takes the value of 0. The control variables are consistent with the main regression model, while controlling for firm fixed effects and year fixed effects, with standard errors clustered at the firm level.

The regression results are reported in column (1) of Table 7. The estimation results show that the coefficient of the interaction term $Treat \times Post$ is 36.43, which is significant at the 1% level. This result indicates that, after the implementation of the policy, the institutional shareholding ratio of the treatment group enterprises increased by an average of 36.43 percentage points. Considering that the average institutional shareholding ratio during the sample period was 268.29% (i.e., 2.6829 in decimal form), this increase is also significant in economic terms. This suggests that the new Securities Law, which strengthens information disclosure requirements, has indeed attracted the attention of more institutional investors, who are core data miners, especially for enterprises with a previously poor data environment.

5.3.2. The Impact of Policies on Analysts' Attention

As another crucial group of data miners and information intermediaries, analysts' tracking behavior can reflect the intensity of market demand for corporate data. This paper adopts the number of analysts' followings as the dependent variable to similarly examine the impact of policies on analysts' attention. Column (2) of Table 7 reports the regression results. The coefficient of the interaction term *Treat*

× *Post* is 1.199, which is significant at the 1% level, indicating that the number of analysts following enterprises in the treatment group increased by an average of about 1.2 after the implementation of the policy. Relative to the sample mean of analysts' attention (10.153), this increase is about 11.8%, which is also economically significant. This suggests that strengthened information disclosure attracts more analysts, who further enhance the data content of stock prices through data mining and information dissemination.

Table 7. Impact of policies on informed investors.

Variable	(1) InstProp	(2) n_analyst
Treat × *Post*	36.43***	1.199***
	(8.97)	(0.443)
Treat	−34.75***	−1.427***
	(7.41)	(0.377)
Post	0 (Omitted)	0 (Omitted)
Size	19.54	3.571***
	(12.87)	(0.362)
Lev	−116.1***	0.012
	(26.81)	(1.119)
ROA	213.6***	33.57***
	(33.39)	(1.766)
CF	−30.88	0.203
	(28.54)	(1.174)
Company Fixed Effects	YES	YES
Year Fixed Effect	YES	YES
Observation Count	28,456	16,810
Adjusted R^2	0.703	0.726

Note: Post in column (1) is omitted due to collinearity with the year fixed effects.

5.3.3. The Mediating Effect of Data Miners

The above analysis indicates that the policy has significantly increased the proportion of institutional shareholding. Does institutional shareholding play a mediating role between enhanced information disclosure and investment-stock price sensitivity? To test this mediating effect, this paper adds the interaction term *InstProp* × *TobinQ* between institutional shareholding and TobinQ to the main regression model, and observes the changes in the coefficient of the triple interaction term *EvalResult* × *Post* × *TobinQ*.

The regression results are reported in Table 8. Column (1) replicates the main regression results as a benchmark, with a triple interaction coefficient of 0.0089. After adding *InstProp* × *TobinQ* in column (2), the triple interaction coefficient

decreases to 0.0085, a decrease of about 4.5%, and remains significant. Meanwhile, the coefficient of *InstProp* × *TobinQ* is 6.64e−06, which is significantly positive at the 1% level, indicating that the higher the institutional ownership ratio, the stronger the investment-stock price sensitivity. This result supports the partial mediating role of institutional ownership: policies enhance the ability of enterprises to learn from stock prices by attracting more institutional investors, but the policy effect is not fully mediated, and there is still some direct effect.

Table 8. Mediating effect of institutional shareholding.

Variable	(1) ln_Inv_f1	(2) ln_Inv_f1
TobinQ	0.0327***	0.0283***
	(0.0056)	(0.0058)
EvalResult × *Post* × *TobinQ*	0.0089***	0.0085**
	(0.0034)	(0.0034)
EvalResult × *Post*	−0.0148**	−0.0153**
	(0.0064)	(0.0064)
EvalResult × *TobinQ*	−0.0087***	−0.0081***
	(0.0027)	(0.0027)
Post × *TobinQ*	−0.0113*	−0.0093
	(0.0063)	(0.0064)
InstProp × *TobinQ*		6.64e−06***
		(1.87e−06)
Size	0.0197**	0.0184**
	(0.0078)	(0.0078)
Lev	−0.1283***	−0.1257***
	(0.0295)	(0.0295)
ROA	0.2843***	0.2830***
	(0.0373)	(0.0373)
CF	−0.0138	−0.0145
	(0.0318)	(0.0318)
Company Fixed Effects	YES	YES
Year Fixed Effect	YES	YES
Observation Count	23,317	23,315
Adjusted R^2	0.570	0.570

In summary, the mechanism test results indicate that the new Securities Law has significantly attracted more attention from institutional investors and analysts, two core data miners, by strengthening information disclosure. Furthermore, institutional shareholding plays a partial mediating role between the strengthening of information disclosure and investment-stock price sensitivity. These findings

reveal the transmission path of policy effects, that is, the strengthening of information disclosure ultimately enhances the ability of enterprises to learn from capital market data by improving the market data environment and attracting data miners, forming a complete closed loop of data value creation.

5.4. Heterogeneity Analysis

The previous regression and mechanism tests indicate that the new Securities Law has significantly improved the investment-stock price sensitivity of enterprises with poor information disclosure quality by strengthening information disclosure, and this effect is partially achieved by attracting data miners. However, is there a significant difference in this effect among enterprises with different characteristics? From the perspective of data science, the value of data depends on data density and data transformation capability. This section conducts a heterogeneity analysis from two dimensions: high-tech industries, representing data density, and financing constraints, representing data transformation capability, to reveal the boundary conditions of the value of information disclosure data.

5.4.1. Heterogeneity Analysis Based on Industry Technical Characteristics: Impact of Data Density

High-tech industry enterprises typically exhibit higher R&D investment and a larger proportion of intangible assets. Their investment opportunities are difficult to reflect through traditional financial indicators fully; they rely more on external data feedback to identify investment opportunities and assess project prospects. From a data science perspective, high-tech industries exhibit higher data density and greater information value, making the value of data mining even more significant. This paper anticipates that the impact of enhanced information disclosure on market feedback effects should be more pronounced in high-tech industries.

To test this expectation, this paper divides the sample into a high-tech industry group and a non-high-tech industry group according to the classification standards of high-tech industries, and estimates the main regression model separately. The high-tech industries are classified based on the "Classification of High-tech Industries (Manufacturing) (2017)" published by the National Bureau of Statistics of China. The coefficient of the core interaction term $EvalResult \times Post \times TobinQ$ in the high-tech industry group is 0.0103, which is significant at the 1% level; in the non-high-tech industry group, the coefficient is 0.0058, which is not statistically significant. The test for between-group coefficient differences shows that there is a significant difference between the coefficients of the two groups at the 5% level. This result indicates that the enhancement effect of information disclosure on investment-stock price sensitivity mainly exists in the high-tech industry, while this effect is not significant in the non-high-tech industry. This finding is consistent with theoretical expectations: high-tech enterprises have higher data density and stronger dependence on external data feedback, thus benefiting more from the enhancement of information disclosure, revealing the important role of data density as a boundary condition for data value.

5.4.2. Heterogeneity Analysis Based on Financing Constraints: The IMPACT of Data Transformation Capability

The degree of financing constraints limits the ability of enterprises to learn from the market. Enterprises with low financing constraints possess more abundant financial resources and greater investment flexibility, enabling them to adjust investment decisions promptly based on stock price data; that is, they have stronger data transformation capabilities. However, enterprises with high financing constraints may be unable to implement new data obtained from stock prices due to financial constraints, thus manifesting as an inability to effectively transform data value. This paper predicts that the impact of enhanced information disclosure on the market feedback effect should be more pronounced in enterprises with low financing constraints.

Table 9. Heterogeneity analysis results.

Variable	(1) High-Tech Industry	(2) Non-High-Tech Industry	(3) High Financing Constraints	(4) Low Financing Constraints
TobinQ	0.0429***	0.0215**	0.0379**	0.0426
	(0.0066)	(0.0093)	(0.0169)	(0.0338)
EvalResult* × *Post* × *TobinQ	**0.0103*** **	**0.0058**	**0.0114**	**0.0320***
	(0.0037)	**(0.0054)**	**(0.0091)**	**(0.0165)**
EvalResult × *Post*	−0.0148*	−0.0126	−0.0043	−0.0390
	(0.0083)	(0.0091)	(0.0152)	(0.0327)
EvalResult × *TobinQ*	−0.0102***	−0.0055	−0.0143*	−0.0200
	(0.0026)	(0.0045)	(0.0081)	(0.0131)
Post × *TobinQ*	−0.0203**	−0.0009	−0.0118	−0.0434
	(0.0080)	(0.0099)	(0.0168)	(0.0403)
Control Variable	YES	YES	YES	YES
Company Fixed Effects	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES
Observation Count	9986	13,305	3187	2144
Adjusted R^2	0.465	0.612	0.630	0.457

To test this expectation, this paper adopts the SA index proposed to measure the degree of corporate financing constraints. If the SA index is higher than the annual median, the firm is defined as having high financing constraints; otherwise, it is classified as having low financing constraints. The sample is divided into high and low financing constraint groups based on the annual median, and the main regression model is estimated separately for each group. The coefficient of the core interaction term *EvalResult* × *Post* × *TobinQ* in the low financing constraint group is 0.0320, which is marginally significant at the 10% level; in the high financing constraint group, the coefficient is 0.0114, which is not statistically significant. The test for between-group coefficient differences reveals a significant difference between the two groups at the 10% level. This result indicates that the enhancement effect

of information disclosure on investment-stock price sensitivity mainly exists in low financing constraint firms, while this effect is not significant in high financing constraint firms. This finding aligns with theoretical expectations: low financing constraint firms possess stronger data transformation capabilities, enabling them to adjust investments promptly based on stock price data, thereby better utilizing the market feedback brought by enhanced information disclosure; high financing constraint firms, even if they obtain more data, may be unable to respond effectively due to financial constraints, revealing the important role of data transformation capabilities as a boundary condition for data value.

Based on the heterogeneous analysis results in Table 9, this paper finds that the enhancement effect of information disclosure on investment-stock price sensitivity is more significant in high-tech industries and enterprises with low financing constraints, while it is not significant or weaker in non-high-tech industries and enterprises with high financing constraints. This finding supports research hypothesis H3 and reveals the boundary conditions of the value of information disclosure data. High-tech industry enterprises have higher data density and stronger dependence on external data feedback, thus benefiting more from policies; enterprises with low financing constraints possess stronger data transformation capabilities, enabling them to better convert stock price data into actual investment adjustments. These findings further strengthen the interpretation of the main regression results: the enhancement of information disclosure indeed optimizes corporate investment decisions by enhancing the data content and feedback effect of stock prices, and this effect depends on the data density and data transformation capabilities of enterprises.

6. Robustness Test

To ensure the reliability and generalizability of the causal effects extracted from the disclosed information data, this chapter conducts a series of robustness tests from multiple dimensions, including data sensitivity analysis, model setting robustness, pseudo-intervention verification, data cleaning sensitivity, confounding variable control, and standard error adjustment, in order to verify the reliability of the core conclusions.

6.1. Replace the Measurement of Investment Variables

In the main regression, capital expenditure is used to measure corporate investment. To test whether the conclusions are sensitive to the method of investment measurement, this paper switches to fixed assets investment as a proxy variable for investment expenditure, reconstructs the logarithmic investment index $lnInvCAPEX_{t+1}$, and re-estimates the main regression model. This is equivalent to cross-validation with alternative data sources in data science—by changing the operational definition of the core variable, it examines the impact of changes in core data characteristics on the conclusions. The coefficient of the core interaction term $EvalResult \times Post \times TobinQ$ is 0.0090, which is significant at the 5% level and highly consistent with the main regression results. This indicates that the conclusions of this

paper do not depend on a specific method of investment data measurement and exhibit good data robustness.

6.2. Replace Tobin's Q Measure

In the main regression, the current Tobin's Q is used to measure market valuation, which may introduce an endogeneity issue due to the simultaneous influence of investment and stock prices. That is, the bidirectional causality between data features may interfere with causal identification. To alleviate this concern, this paper replaces the current value with Tobin's Q lagged by one period ($TobinQ_{lag}$), reconstructs the interaction term, and estimates the main regression model. This is equivalent to introducing a time lag structure in data feature engineering to mitigate the interference of contemporaneous correlation on causal inference. The coefficient of the core interaction term $EvalResult \times Post \times TobinQ_{lag}$ is 0.0077, which is significant at the 5% level. This indicates that even after excluding the contemporaneous correlation between current stock prices and investment, the enhancement effect of information disclosure on investment-stock price sensitivity remains robust.

6.3. Control Industry-Year Combined Fixed Effects

The main regression model controls for firm fixed effects and year fixed effects, but fails to eliminate the potential interference on the estimation results from unobservable factors that change over time at the industry level. To absorb the time-varying shocks at the industry level, this paper further controls for the interactive fixed effects of industry and year, generating industry-year joint dummy variables and incorporating them into the model. This is equivalent to controlling for higher-dimensional environmental heterogeneity in the causal inference model to eliminate the impact of data fluctuations at the industry level. The coefficient of the core interaction term $EvalResult \times Post \times TobinQ$ is 0.0081, significant at the 5% level, with no significant difference from the main regression results. This indicates that time-varying factors at the industry level are not the reason driving the conclusions of this paper.

6.4. Placebo Test

To verify that the policy effect indeed stems from the implementation of the new Securities Law in 2020 and not from other temporal trends, this paper conducts a placebo test. Assuming that the policy was implemented two years earlier, in 2018, we construct a dummy policy time point $PlaceboPost = 1$ (year ≥ 2018), regenerate the corresponding interaction term, and perform regression. This is equivalent to pseudo-intervention verification in data science—by artificially creating a dummy policy time point, we test whether the causal effect exists only at the actual intervention time point. The coefficient of the core interaction term $PlaceboEval \times PlaceboPost \times TobinQ$ is 0.0037, which is statistically insignificant. This indicates that there is no significant treatment effect at the dummy policy time point, thereby ruling out the possibility that other temporal trends drove the main regression results. It

confirms the time-specificity of the policy effect and enhances the credibility of the causal inference.

6.5. Excluding the Sample of IPO Companies in That Year

The main regression sample includes companies that IPOed in the current year (Age < 1), and these companies may interfere with the regression results due to significant fluctuations in financial data during the initial listing period. To eliminate this influence, this paper excludes the sample of IPO companies in the current year (i.e., retains observations with Age > 0) and re-estimates the main regression model. This test is equivalent to a sensitivity analysis of data cleaning—it examines whether the core conclusions remain robust after excluding samples that may have data quality issues. The coefficient of the core interaction term *EvalResult* × *Post* × *TobinQ* is 0.0089, which is still significant at the 1% level and is completely consistent with the main regression results, indicating that the conclusions are not affected by abnormal observations during the initial IPO period.

6.6. Add Corporate Governance Control Variables

The main regression model controls for basic company characteristics, but may have omitted the impact of corporate governance factors on investment decisions. To eliminate the interference of corporate governance characteristics, this paper further incorporates corporate governance variables such as board size (*DirectorNum*), proportion of independent directors (*IndepDirNum*), and whether the chairman and general manager are the same person (Duality), based on the main regression. This approach is equivalent to controlling for more potential confounding variables in the causal inference model to reduce omitted variable bias. The coefficient of the core interaction term *EvalResult* × *Post* × *TobinQ* is 0.0093, which is significant at the 1% level and shows no significant difference from the main regression results, indicating that the conclusion is not affected by omitted variables of corporate governance characteristics.

6.7. Use Industry Clustering Standard Error

In the main regression, firm-level clustered standard errors were employed to address potential serial correlation and heteroskedasticity issues. To examine the sensitivity of standard error estimation to the choice of clustering level, this paper reran the regression using industry-level clustered standard errors. The coefficient of the core interaction term *EvalResult* × *Post* × *TobinQ* is 0.0089, which is significant at the 5% level, indicating that the conclusion is not sensitive to the choice of standard error clustering level, and data dependence does not affect the statistical significance of the core causal effect.

6.8. Excluding the Confounding Effect of the COVID-19 Pandemic

The implementation of the new Securities Law in March 2020 coincided with the outbreak of the COVID-19 pandemic, which may have independently affected cor-

porate investment decisions. To rule out the pandemic as a driver of our results, this paper conducts two additional tests. First, we add a control for the severity of the pandemic at the province-year level, measured by the number of confirmed COVID-19 cases per million population in the province where the firm is headquartered ($COVID_{severity}$). The coefficient of the triple interaction term *EvalResult* × *Post* × *TobinQ* remains significant at the 5% level after including this control (coefficient = 0.0087, t = 2.58). Second, we exclude firms in industries most directly hit by the pandemic, including transportation, hospitality, and retail (CSRC industry codes F, H, and L). The results remain robust, with a triple interaction coefficient of 0.0084 (t = 2.47). These tests suggest that our findings are not driven by the COVID-19 pandemic.

6.9. Using Pre-Policy Disclosure Rating Only

To address concerns about time-varying treatment intensity, this paper re-estimates the main model using the 2019 disclosure rating as the fixed treatment measure ($EvalResult_{pre2019}$). The coefficient of $EvalResult_{pre2019} \times Post \times TobinQ$ is 0.0076, significant at the 5% level (t = 2.41), confirming that our main findings are not driven by post-policy changes in the rating variable.

The robustness test results are summarized in Table 10.

Table 10. Robustness test results.

Variable	(1) Change Investment	(2) Lagging TobinQ	(3) Industry-Year FE	(4) Placebo Test	(5) Exclude IPO	(6) Incorporate Governance Variables	(7) Industry Clustering	(8) Exclude COVID-19	(9) Pre-Policy Rating
	ln_Inv_CAPEX	ln_Inv_f1	ln_Inv_f1	ln_Inv_f1	ln_Inv_f1	ln_Inv_f1	ln_Inv_f1	ln_Inv_f1	ln_Inv_f1
EvalResult* × *Post* × *TobinQ	**0.0090**	**0.0077**	**0.0081**	0.0037	**0.0089**	**0.0093**	**0.0089**	**0.0087**	**0.0076**
	(0.0036)	**(0.0031)**	**(0.0033)**	(0.0037)	**(0.0034)**	**(0.0034)**	**(0.0044)**	**(0.0034)**	**(0.0032)**
TobinQ	0.0325***		0.0300***	0.0231***	0.0327***	0.0335***	0.0327***	0.0325***	0.0328***
	(0.0060)		(0.0057)	(0.0067)	(0.0056)	(0.0056)	(0.0074)	(0.0057)	(0.0058)
TobinQ_lag		0.0306***							
		(0.0057)							
PlaceboEval × *PlaceboPost* × *TobinQ*				0.0037					
				(0.0037)					
Control Variable	YES	YES	YES	YES	YES	YES	YES	YES	YES
Company Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES
industry-Year FE	FALSE	FALSE	YES	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Observation Count	28,458	18,698	23,291	23,317	23,317	22,656	23,317	23,317	23,317
Adjusted R^2	0.555	0.589	0.579	0.570	0.570	0.572	0.570	0.571	0.569

7. Conclusion and Implications

7.1. Research Findings

Information disclosure is a core institutional arrangement for the healthy operation of the capital market and a core data asset that enterprises release to the market. The implementation of the new Securities Law in 2020 brought historic changes to the regulation of information disclosure in China's capital market and provided a rare institutional scenario for examining how information disclosure data empowers market participants' decision-making and optimizes corporate investment behavior. This paper takes Chinese A-share listed companies from 2017 to 2024 as research samples, measures the quality of corporate information disclosure using continuous information disclosure ratings, and systematically examines the impact, mechanism, and heterogeneity of the new Securities Law's strengthening of information disclosure on corporate investment-stock price sensitivity using a difference-in-differences model. It reveals the value creation process of information disclosure data from a data science perspective.

The main findings of this article are as follows:

Firstly, information disclosure data holds value in empowering corporate decision-making. After the implementation of the new Securities Law, the investment-stock price sensitivity of enterprises with poor information disclosure quality has significantly increased. A one-level deterioration in disclosure rating is associated with a 0.0089 unit increase in sensitivity; relative to the sample mean sensitivity of 0.0327, this corresponds to a 27.2% increase, which is economically meaningful. This indicates that the enhancement of information disclosure has a substantial impact on optimizing corporate investment decisions. This conclusion remains robust after controlling for firm fixed effects, year fixed effects, and a series of enterprise characteristics, and has passed various robustness tests such as variable measurement replacement, model setting changes, and placebo tests. From the perspective of data science, this finding implies that the quality and consumability of information disclosure rating data, as the core data resource of corporate governance, can effectively enhance the ability of enterprises to learn from the market, forming a complete closed loop from data release to data mining to data feedback, and ultimately to data-driven decision-making.

Secondly, the value release of information disclosure data relies on the participation of data miners. Mechanism tests indicate that after the implementation of the policy, the institutional shareholding ratio of the treatment group enterprises increased by an average of 36.43 percentage points, and the attention from analysts increased by an average of 1.2 people. Institutional shareholding plays a partial mediating role between the enhancement of information disclosure and investment-stock price sensitivity. This finding reveals the transmission path of information disclosure data, empowering decision-making: the improvement in the quality of information disclosure data attracts more attention from data miners, namely, institutional investors and analysts. These professional data users mine incremental information from the original disclosure data through a series of processing activ-

ities, such as data collection, cleaning, processing, and analysis, and integrate it into trading decisions, ultimately making stock prices an aggregate of processed information. When managers learn new information from stock prices and adjust investment decisions accordingly, the value of data is recirculated and released.

Thirdly, the value of information disclosure data is subject to boundary conditions. Heterogeneity analysis reveals that the strengthening effect of information disclosure is more pronounced in high-tech industries and enterprises with low financing constraints, while it is not significant or weaker in non-high-tech industries and enterprises with high financing constraints. Enterprises in high-tech industries have higher data density, stronger information asymmetry, and greater dependence on external data feedback, thus benefiting more from the strengthening of information disclosure. Enterprises with low financing constraints possess stronger data transformation capabilities, enabling them to better translate stock price information into actual investment adjustments. This finding reveals that data value and data transformability are important moderating factors that affect the effectiveness of data-driven decision-making, providing empirical evidence for understanding the boundary conditions of data-empowered decision-making.

7.2. Theoretical Contribution and Practical Implications

7.2.1. Theoretical Contribution

This paper enriches the existing literature in the following aspects: Firstly, it complements the research based on the JOBS Act by Pinto (2023) and, for the first time, examines the impact of enhanced information disclosure on the market feedback effect in the context of Chinese institutions, revealing the asymmetry between information disclosure and market efficiency. From the perspective of data science, this finding indicates that both an increase and a decrease in data supply may lead to the release of data value, but the targets and mechanisms of action differ, providing a new perspective for understanding the marginal value of data resources.

Secondly, it reveals the complete transmission mechanism from information disclosure to data miners to data feedback, providing micro-level evidence for understanding the sources of stock price data content. This paper opens the traditional "information disclosure to market efficiency" black box, elucidates the core role of institutional investors and analysts as data miners, and reveals a three-stage model of data value creation: data release (corporate disclosure), data mining (investor processing), and data feedback (stock price feedback).

Thirdly, the heterogeneity analysis indicates that enterprise data density and data transformation capability are crucial moderating factors influencing the value of information disclosure data, offering empirical support for the boundary conditions of the theory. This finding reveals that data-driven decision-making is not universally applicable, but rather depends on the data mining capabilities of data users and the data transformation capabilities of data applicators, providing a theoretical basis for constructing differentiated data governance policies.

7.2.2. Practical Implications

This paper finds important implications for regulators, listed companies, and investors.

For regulatory bodies, the new Securities Law's emphasis on strengthening information disclosure not only helps protect investors' rights and interests but also optimizes corporate investment decisions and enhances resource allocation efficiency. This positive effect is particularly prominent in enterprises with poor information environments, indicating that regulatory reforms have a compensatory effect for firms with weak information environments—by improving the quality of underlying data, enabling information-disadvantaged firms to benefit from data dividends. In the future, reforms of the information disclosure system should continue to adhere to the principle of "simplicity, clarity, and accessibility", reduce the processing costs for data users, and simultaneously consider the data needs and data production capabilities of different types of enterprises to build a fairer and more efficient data ecosystem.

For listed companies, information disclosure is not only a compliance obligation but also a strategic data asset. This paper finds that moderately improving the quality of information disclosure can attract more attention from data miners (long-term institutional investors and analysts), enhance market feedback, and optimize investment decisions. Enterprises should attach importance to the strategic value of information disclosure and regard it as an important means to enhance corporate governance and market competitiveness. Especially in the era of data-driven smart economy, the release of high-quality data can form a positive cycle of "disclosure to attention to feedback to optimization", making enterprises truly become creators and beneficiaries of data value.

For investors, this paper finds that companies with higher quality of information disclosure have higher data content in their stock prices, making their investment decisions more valuable for reference. This finding suggests that investors should pay attention to the quality of information disclosure of companies when making investment decisions, and use it as an important reference for evaluating the data value and investment potential of companies. At the same time, investors should enhance their data mining capabilities, learn to extract incremental information from the raw data disclosed by companies, and gain a competitive advantage in the data-driven capital market.

7.3. Research Limitations and Future Prospects

Despite the rigorous research design and empirical analysis in this paper, there are still several limitations that need to be further addressed in future research. Firstly, the information disclosure rating data only covers a portion of listed companies, and the rating criteria may exhibit a certain degree of subjectivity. From a data science perspective, the rating data used in this paper is manually labeled, which may introduce issues such as labeling bias and incomplete coverage. In the future, methods such as text analysis, natural language processing, and machine

learning can be integrated to construct more refined metrics for measuring information disclosure quality. For instance, indicators such as readability, timeliness of information disclosure, and the level of detail in information disclosure can be extracted from annual report texts to enhance the reliability and granularity of research conclusions. Secondly, institutional investors come in various types, and significant differences exist in their motivations and capabilities for data mining. This paper fails to distinguish the heterogeneous effects of stable, trading, and quasi-index institutional investors. In the future, the classification of institutional investors can be further refined to delve deeper into the differentiated roles of different types of data miners in the enhancement effect of information disclosure, revealing the impact of data mining subject heterogeneity on the release of data value. Thirdly, this paper focuses on investment-stock price sensitivity, a market feedback effect indicator. However, the content that enterprises learn from the market is not limited to investment decisions, but may also involve financing decisions, research and development innovation, mergers and acquisitions, and other aspects. From a data science perspective, the application scenarios of information disclosure data need to be further expanded. In the future, research can be conducted on the impact of information disclosure enhancement on other strategic decisions, such as corporate financing costs, innovation efficiency, and M&A performance, to more comprehensively evaluate the value creation effect of information disclosure data.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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